A cladding reinforcement system and method for attaching a cladding material to a substructure are provided in this disclosure. The cladding reinforcement system utilizes a cladding reinforcement anchor to provide a large surface area for resisting the forces in high wind applications. In some implementations, the cladding reinforcement anchor has a flat front surface that is adapted to be fastened to the cladding panel. The front surface of the cladding reinforcement anchor is sufficiently flat so that it can be sandwiched between two cladding panels without creating any visible space between the cladding panels. In some other implementations, the cladding reinforcement anchor includes a web having first and second spaced apart edges configured to define a predetermined width for locating the cladding reinforcement anchor against an upper edge of a cladding panel. Fixing indicators can be located on the flat front surface to provide targets for nails or other fasteners.
SYSTEMS AND METHODS FOR INSTALLING CLADDING ASSEMBLIES

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of United Kingdom Patent Application No. GB1112337.9, filed Jul. 18, 2011, and is incorporated by reference herein in its entirety.

BACKGROUND

[0002] 1. Field


[0004] 2. Description of the Related Art

[0005] Any discussion of the prior art throughout the specification should in no way be considered as an admission that such prior art is widely known or forms part of the common general knowledge in the field.

[0006] Many cladding materials, such as timber, vinyl, and fiber cement have been used in plank or weatherboard form to construct exterior wall assemblies on buildings. Typically, each piece of such cladding material is installed so that its lower edge covers the fixing positions of the previously installed piece. The location, strength, and configuration of the nail provide the resistance of the wall assembly to applied loads, such as wind loads. The installation techniques rely on installer skill to be able to accurately and reproducibly fix cladding pieces in position in line with the manufacturer’s recommendations. In extreme wind load conditions, either the nail shank releases from the substructure, or the nail head may be pulled through the cladding. In either case, the cladding material is released from its installed position because of the concentration of wind load pressure on the fixings, leading to damage to the cladding material and possible other damage to the structures and substructures around the cladding material.

[0007] Screw fixing of cladding materials to substructures has been used to improve the wind load capacity of wall assemblies, but screw fixing is more expensive and slows the installation rate. Screw fixing increases the holding power of the shank but the head may still be pulled through the cladding, once again due to the concentration of wind load pressure on the fixings.

[0008] Thus, there is a need for improved systems and methods for installing cladding assemblies that is cost-efficient, easy to use, and provides the cladding assemblies with increased wind load resistance and other favorable properties.

SUMMARY OF THE INVENTION

[0009] Disclosed herein are improved systems and methods for installing cladding assemblies. In one embodiment, the disclosure provides an easy-to-use cladding reinforcement system that is configured to affix cladding materials to an exterior wall assembly in a manner so as to increase the wind load resistance of the cladding materials without increasing number of fasteners used. In some embodiments, the cladding reinforcement system is adapted to provide a larger pressure zone in a cladding assembly across which the load is distributed in high wind load applications. In some embodiments, the configuration, material, and dimensions of the cladding reinforcement systems combine synergistically to increase the wind load resistance of the cladding boards without increasing the number of fasteners such as nails used.

In some embodiments, the placement of the cladding reinforcement system is selected at strategic locations in the cladding assembly to facilitate installation and reduce the number of fasteners needed. In some implementations, the cladding reinforcement system improves the wind load of a cladding panel by about 50% to about 143% as compared to an equivalent cladding panel fastened by the same number of nails.

[0010] In another embodiment, a reinforcement anchor for mounting a cladding panel to a building structure is disclosed. The reinforcement anchor comprises a web having first and second spaced apart edges. The edges are configured to define a predetermined width for locating the anchor against an upper edge of an elongate cladding panel. In one implementation, the web further comprises a first leg extending at a first predetermined angle from the first edge of the web. The angle can be optimized for locating the first leg against a front face of an elongate cladding panel. At least one fixing indicators can be disposed on the first leg for indicating at least one predetermined fixing position. In another implementation, the web also includes a second leg extending at a second predetermined angle from the second edge of the web. The second leg can be much shorter than the first leg. In some implementations, the second leg comprises a lip extending from the second edge of the web. In a preferred implementation, the first leg has a length of 0.5 to 1.5 in and a width of 1 to 3 in. Preferably, the aspect ratio and area of the first leg are selected to improve the wind load resistance of the cladding assembly.

[0011] The configuration of the reinforcement anchor can vary without departing from the scope of the present disclosure. In some embodiments, the second leg extends from the second edge of the web in the same direction as the first leg. In other embodiments, the second leg extends from the second edge of the web in a different direction to the first leg. In yet some other embodiments, the first predetermined angle from which the first leg extends from the first edge is between 45 and 135 degrees. In yet some other embodiments, the second predetermined angle from which the second leg extends from the second edge can be acute or obtuse.

[0012] The first or the second leg can further comprise more than one fixing indicators. In some implementations, the fixing indicator can be an aperture, indentation, or surface marking for receiving a nail shank. The surface markings are particularly useful in situations where the installer wishes to place the nail shank at a different spot or that the nail is not placed dead center on the fixing indicator. Unlike apertures or indentations, the surface markings provide a wider tolerance for the nail shank because the nail shank will not cause tearing or damage to the fixing indicator even if it misses the target. Additionally, the material of the reinforcement anchor is preferably strong and yet lightweight. In some embodiments, the reinforcement anchor is formed from a resilient material selected from the group consisting of metals, polymers, and reinforced polymer composites. In some embodiments, cladding panels that incorporate reinforcement anchors according to the certain preferred implementations show significant improvements in wind load resistance as compared to an equivalent cladding panel fastened by an equal number of nails. For example, the wind load resistance before failure can be increased by at least about 55%, 72%, and 140% as compared to the use of a screw without a reinforcement anchor. In some embodiments, an ultimate negative load allowed before failure is about 156, 176, or 253 psf.
A cladding reinforcement apparatus for attaching a thin elongate cladding material to a substructure is disclosed. The cladding reinforcement apparatus generally comprises a web having first and second spaced apart edges. The edges define a predetermined width configured to approximately match an upper edge of a thin elongate cladding material. A first leg extends at a predetermined angle from the first edge of the web, wherein the angle is selected to locate the first leg against a front face of the thin elongate cladding material. A second leg extends at a second predetermined angle from the first edge of said web, wherein the angle is configured to locate the second leg against a substructure. At least one fixing indicator is located on the first leg, which is configured to direct a fastener to an optimal location on said thin elongate cladding material. Preferably, the cladding reinforcement anchor is sized and configured with a large surface area to prevent movement of said thin elongate cladding material during a high wind load application.

A cladding fastening device for attaching a cladding panel to a building structure is disclosed. The cladding fastening device generally comprises a first planar member and a second planar member wherein the two planar members are positioned at an angle relative to each other. Preferably, the surface area of the first planar member is greater than the surface area of the second planar member. In one embodiment, a lip extends from an outer edge of the second planar member in a direction that is substantially parallel to the first planar member. In another embodiment, a third planar member extends from an outer edge of the second planar member in a direction that is substantially parallel to the first planar member. In yet another embodiment, a plurality of apertures are formed on the first planar member. In yet another embodiment, the second planar member is configured to approximate the thickness of the cladding panel. The cladding fastening device can be used to attach the cladding panel to the building structure by positioning the device along an upper lateral edge of the cladding panel such that the second planar member rests against the upper lateral edge and the first planar member rests against the front surface of the cladding panel. Preferably, the first planar member remains flat and does not protrude outwardly from the front surface of the cladding panel. A nail can then be driven into the cladding panel through one or more apertures on the first planar member, thereby attaching the cladding panel to the building structure.

A method of installing a cladding assembly to a building structure is disclosed comprising positioning a first cladding panel adjacent the building structure and attaching the first cladding panel to the building structure by using a nail and a cladding reinforcement anchor. Preferably, the cladding reinforcement anchor comprises a planar face having an area of at least 2 in², wherein the nail attaches the anchor to the cladding panel and the cladding panel to the building structure. Preferably, the cladding reinforcement anchor has a flat planar face such that the reinforcement anchor does not protrude outwardly when attached to the first cladding panel. Aligning and mounting a second cladding panel in partial overlapping fashion on the first cladding panel covering the cladding reinforcement anchor. Preferably, when the second cladding panel is positioned on top of the cladding reinforcement anchor, no significant gap is created between the two cladding panels.

Detailed Description

Embodiments of the disclosure can be used to overcome or ameliorate at least one of the disadvantages of the prior art, or to provide a useful alternative. Some embodiments of a cladding reinforcement anchor described below can provide a larger pressure zone in a cladding assembly. The load created by high winds can be distributed over a larger area, thus making it less likely for the cladding assembly to be removed from the structure beneath. Additionally, the cladding reinforcement anchor can prevent a fastener from being pulled through a cladding material. In some embodiments, the cladding reinforcement anchor has a flat and unobtrusive front face so that it can be covered by adjacent overlapping cladding panels without creating any visible gap between the two panels.

As described below, the cladding reinforcement anchor can be inserted onto the top or bottom of a cladding material. A fastener can be inserted through the cladding reinforcement anchor, through the cladding material, and into the substructure. Therefore, the cladding reinforcement anchor is attached to the cladding material and both the reinforcement anchor and the material are attached to the substructure. As the cladding reinforcement anchor can be much larger than the head of the fastener, the force during high winds will be spread over the entire cladding reinforcement anchor, lowering the total pressure at each spot. The use of a cladding reinforcement anchor can allow for the installation of a cladding material in higher wind locations than a cladding material attached with only a fastener. Additionally, the cladding reinforcement anchor can be made of a harder material, preventing the fastener from pulling through the cladding material.

The term "cladding material" as used herein is a broad term and includes its ordinary dictionary definition and also refers to timber, vinyl and fiber cement materials.
have been used in plank or weatherboard form to construct wall assemblies on buildings. Other shapes and materials can be used as well.

[0026] The term “fastener” as used herein is a broad term and includes its ordinary dictionary definition and also refers to nails, screws, etc.

Cladding Reinforcement Anchor

[0027] Referring to the drawings, FIG. 1 shows a perspective view of a cladding reinforcement anchor 100, for providing a larger pressure zone in a cladding assembly. The cladding reinforcement anchor 100 can be used to distribute a high wind load force, thereby allowing a cladding assembly to stay intact under higher than normal wind load applications. The cladding reinforcement anchor 100 has a web 101 comprising first and second spaced apart edges 102, 103 respectively. In some embodiments, the edges 102/103 can be generally rounded, or radiused, to prevent potential injury to a user grasping the cladding reinforcement anchor 100. In some embodiments, the edges 102/103 can also be relatively squared off for ease of manufacturing the reinforcement anchors. The shape of the edges 102/103 is not limiting.

[0028] The edges 102/103 can be configured to define a predetermined width 104 of the web 101 and configured to locate the reinforcement anchor 100 against the upper edge 105 of a thin elongate cladding material 106. The web 101 spans approximately the same length as the two edges 102/103. The web 101 can be shaped or profiled to form a complementary mating profile to that of an upper edge 105 of the cladding material 106. The web 101 can be in the form of a thin rectangular plate, or can be a thin plate that is profiled to match an upper edge 105 of a cladding material 106. For example, the web 101 can be flat, pointed, rounded, etc. to match the upper edge 105 of the cladding material 106. The shape of the web 101 is not limiting. In some embodiments, the length of the web 101 is preferably 1.5 to 2.5 in.

[0029] A first leg 107 is shown extending at a first predetermined angle 108 from the first edge 102 of the web 101. Angle 108 can be optimized for locating said first leg 107 against a front face 109 of the thin elongate cladding material 106. The angle 108 can be approximately 90° to match the cladding material 106. Other angles can be chosen as well, depending on the shape of the cladding material 106. The angles chosen for angle 108 can be acute or obtuse, and can range from approximately 45° to approximately 135°. In a preferred embodiment, the first leg 107 is substantially flat with no protrusions.

[0030] A second leg 112 is shown extending at a second predetermined angle 113 from the second edge 103 of the web 101. The second leg 112 can rest against the opposite side of the cladding material 106 as the first leg 107. Angle 113 can be approximately 90°. Other angles can be chosen as well, depending on the shape of the cladding material 106. The angles chosen for angle 113 can be acute or obtuse and can range from approximately 45° to approximately 135°.

[0031] In some embodiments, the second leg 112 can be shorter than the first leg 107. For example, the second leg 112 can be one half the length of the first leg 107 or the second leg 112 can extend less than 2.54 in from the web 101, or extend very slightly, preferably less than 1 in, just sufficient to engage with the edge of the cladding material. In yet another embodiment, the second leg 112 is a lip that extends from the second edge 103. In other embodiments, the second leg 112 can be similar in length to the first leg 107. In other embodiments, the second leg 112 can be longer than the first leg 107. The second leg 112 can be long enough to hold the cladding reinforcement anchor 100 onto a cladding material 106. The second leg 112 can be used to hold the cladding reinforcement anchor 100 in place while attaching the reinforcement anchor 100, and the cladding material 106, to the substructure. The second leg 112 can be sized to fit around the cladding material 106 to prevent movement of the cladding reinforcement anchor during installation.

[0032] Generally, the cladding reinforcement anchor 100 can be placed directly over the cladding material 106, as shown in FIG. 1, so that the edges 102 and 103 are located on opposite sides of the cladding material 106 and the web cladding material 106 rests directly on the web 101. The first leg 107, second leg 112, and web 101 can surround the cladding material 112. Upon insertion of the cladding material 106 into the cladding reinforcement anchor 100, the cladding reinforcement anchor 100 will have limited motion, allowing a user to install the cladding reinforcement anchor 100 with one hand or with multiple hands.

[0033] The first leg 107 can have at least one fixing indicator 110 for indicating at least one predetermined fixing position. The fixing indicators 110 can be circular, triangular, rectangular, etc. and the size and shape of the indicator 110 is not limiting. The fixing indicators 110 can be located anywhere on the front leg 107, for example in a straight line or randomly placed, and the position of the indicators 110 is not limiting. The fixing indicators 110 can comprise indentations into the cladding reinforcement anchor 100 so a fastener, such as a nail or screw, can be directed to the center of the fixing indicator 110. The fixing indicators 110 can help direct the fastener to the proper position for installation of the cladding material 106. By directing the fastener to the appropriate position, the cladding reinforcement anchor 100 can keep the cladding material 106 attached to a substructure, even in high wind applications. If the fixing indicator 107 was not used, the optimal position for the cladding reinforcement anchor 100 may not be used, thus potentially decreasing the usefulness of the cladding reinforcement anchor 100. In some embodiments with multiple fixing indicators 110, the fixing indicators 110 can cover multiple cladding materials, as discussed with respect to FIG. 2. Multiple fixing indicators 110 can also help leverage the cladding material 106 to a substructure, thereby increasing the load necessary to pull the cladding material 106 away from the substructure, such as in high wind load applications.

[0034] FIG. 1 shows a configuration of a cladding reinforcement anchor 100 where the second leg 112 extends from the second edge 103 of the web 101 in the same direction as the first leg 107, to define a substantially U-shaped channel. The width 104 of web 101 can be tailored to match the width 111 of the cladding material 106 with which it will be used so that the cladding material fits within the channel. A projection of cladding reinforcement anchor 100 is also shown in FIG. 1, selectively positioned onto cladding material 106 as it would be in use. Once cladding reinforcement anchor 100 has been selectively positioned onto cladding material 106, the cladding material can be fixed to the building substrate (not shown) by nailing through cladding reinforcement anchor 100 and the cladding material 106 at one or more of the fixing indicators 110. The fixing can be done by, for example, nailing or screwing the cladding reinforcement anchor 100 onto the cladding material 106. The means for fixing the cladding reinforcement anchor 100 is not limiting. In this embodiment,
the cladding reinforcement anchor 100 can be manufactured from approximately 0.5 mm thick stainless steel. The web 101 can be approximately 9 mm wide and approximately 156 mm long. First leg 107 can extend approximately 28 mm from first edge 102 of web 101. Second leg 112 can extend approximately 10-15 mm from second edge 103 of web 101. Dimensions may be varied to suit a variety of cladding materials or installation types. The size and material of the cladding reinforcement anchor 100 is not limiting.

[0035] The web 101 and first and second legs 107/112 can cover a larger portion of the cladding material 106 than an individual fastener, such as a nail or screw. This provides for a larger surface area that the cladding material 106 will be able to exert force on under high load applications, such as high wind load. As the load is distributed over a larger area, the cladding reinforcement anchor 100 can prevent the cladding material 106 from coming off any substructure the cladding material 106 is attached to. Therefore, the cladding reinforcement anchor 100 can better prevent the cladding material 106 from coming off a substructure than conventional attachment means, such as a nail or screw. Additionally, the cladding reinforcement anchor 100 can prevent the fastener from being pulled through the cladding material 106, as the cladding reinforcement anchor 100 can be made of a stronger material than the cladding material 106.

[0036] FIG. 2 shows an embodiment of a cladding reinforcement anchor 200 in use in a cladding installation. In some embodiments, cladding material 201, in the form of a plank, panel, or weatherboard, can be positioned so that its lower edge 202 overlaps the upper edge 203 of the previously installed piece 204. Such an overlap 205 can provide a technical function in hiding and protecting the fixing points 206 of an adjacent plank or weatherboard to the substructure 207. In the embodiment shown in FIG. 2, first and second legs 208 and 209 respectively of cladding reinforcement anchor 200 can extend in substantially the same direction from the first and second edges 210, 211 respectively of web 212 to form a substantially U-shaped channel. The cladding reinforcement anchor 200 can be positioned onto cladding material 201, in a user selectable position, so that web 212 rests against the upper edge 203 of a cladding material 201. The first leg 208 of cladding reinforcement anchor 200 can have a number of apertures 213 for indicating preferred fixing positions. The apertures 213 can have any size, shape, and location on the cladding reinforcement anchor 200. At least one nailing point can be used to fix a cladding material to the building substructure through the cladding reinforcement anchor 200. Having more than one fixing point indicated on a reinforcement anchor 200 provides an option to increase the strength of the connection to the building substructure by using multiple nails at predefined spacings.

[0037] FIG. 2 also illustrates an embodiment of a cladding reinforcement anchor system configured hold multiple cladding materials onto a building substructure. The cladding reinforcement anchor 200 can span two adjacent cladding material pieces at the respective top right and top left corners. The cladding reinforcement anchor 200 can be attached to each cladding material by inserting nails or screws through the apertures 213, discussed above, which cover each cladding material piece. By attaching the cladding reinforcement anchor 200, the cladding material pieces are connected with one another at the corners. The location of the cladding reinforcement anchor can be adjusted through nailing, screwing, etc. through one of the apertures 213 covering the material piece. In some embodiments, the cladding materials are kept flush with one another. As the cladding reinforcement anchor 200 has a second arm 209, the cladding material 201 can be easily adjusted to fit within the cladding reinforcement anchor 200, allowing for alignment during installation. This system allows for less cladding reinforcement anchors to be needed during installation of cladding materials. This system also allows for higher wind load resistance as the cladding materials are all kept together, thereby making it more difficult for a wind force to pull out or move the cladding materials.

[0038] FIG. 3 illustrates an embodiment of a cladding reinforcement anchor using an angle between the web of the second leg 301 that is not equal to 90°. Because the plank can be installed at an angle relative to the building substructure, in an embodiment of a cladding reinforcement anchor as shown in FIG. 3, a cladding reinforcement anchor 300 may have the second leg 301 extending from web 302 in substantially the same direction but at a different angle to that of the first leg 303, to form a modified U-shaped channel. The web 302 can be positioned in a user selectable position such that it rests against the upper edge 306 of a cladding material 304. First leg 303 can cover a portion of face 306 of cladding material 304 and at least one fixing position marker 307 can be formed on or into first leg 303. A fastener can be inserted through the cladding reinforcement anchor 300 into the cladding material 304 and the substructure, thereby securing the cladding material 304 to the substructure. Face 308 of the second leg 301 can rest against the building substructure 309.

[0039] The angle between the web 302 and the second leg 301 and the angle between the web 302 and the first leg 303 can be adjusted. In some embodiments, the angle between the web 302 and the first leg 303 is approximately 90°. This angle can be adjusted so that the first leg 303 rests against the front fact of the cladding material 304. The angle between the web 302 and the second leg 301 can be greater than or less than the angle between the web 302 and the first leg 303. For example, in some embodiments the angle between the web 302 and the second leg 301 can be obute. Therefore, the cladding material 304 can fit against the web 302 and the first leg 303 while a gap can be left between the cladding material 304 and the second leg 301. The second leg 301 can be located on the substructure 309, thereby increasing the load necessary to pull off the cladding material 304. The angle can be varied to suit the configuration of the cladding material with which it is intended to be used, and may be any number between 45° and 135°. Additionally, when a fastener is inserted and tightened into cladding material 304, the cladding reinforcement anchor 300 can be made of a material that can flex. Therefore, the angle between the web 302 and the first leg 303 can be reduced from an obute angle towards 90° as the fastener is tightened, allowing a user to choose the desired angle. Some slight deformation during installation may serve to increase release pressure required in the assembly, thereby providing additional resistance in the pressure zone by forming a resilient spring.

[0040] In an embodiment of a cladding reinforcement anchor, as shown in FIG. 4, a cladding reinforcement anchor 400 can have a web 401 comprising first and second spaced apart edges 402, 403 respectively. The edges can be configured to define a predetermined width 404 of web 401. In the embodiment shown in FIG. 4, the width can be configured to match the profile of the upper edge 405 of cladding material 406.
In this embodiment, cladding reinforcement anchor 400 can have a protrusion 414 on first leg 407 which can be sized and configured to be a complementary profile to protrusion 409 on the surface of cladding material 406. The protrusion 414 can keep the cladding reinforcement anchor 400 from extending away from the cladding material 406 as compared to if the first leg 407 were completely flat and straight. By having the fitted protrusion 414, the cladding reinforcement anchor 400 will have a larger surface area against the cladding material 406. The larger surface area can allow for more force to be placed on the cladding reinforcement anchor 400 and cladding material 406 before the cladding material 406 comes off a substructure. The embodiment shown in FIG. 4 can be used with damaged or non-flat cladding materials 406 and still increase the pressure zone for high wind applications. The protrusion 414 can be performed on the cladding reinforcement anchor 400 or can be configured to be performed upon insertion onto the cladding material 406.

A first leg 407 is shown extending at a first predetermined angle 408 from the first edge 402 of web 401. The angle 408 can be optimized for locating said first leg 407 against a front face 409 of the thin elongate cladding material 406. As mentioned above, the first leg 407 can have at least one fixing indicator 410 for indicating at least one predetermined fixing position 411.

A second leg 412 is shown extending at a second predetermined angle 413 from the second edge 403 of web 401, in this embodiment the first leg 407 and the second leg 412 extend in substantially opposite directions from web 401. The angle 413 can be acute, 90°, or obtuse. For example, the angle 413 can range from about 45° to about 135°. The angle 413 can be adjusted so that the web 401 and the first leg 407 rest relatively flat against the cladding material 406 while the second leg 412 rests relatively flat against the substructure. As discussed with the first leg 407, the second leg 412 can similarly have at least one fixing indicator 415 for indicating at least one predetermined fixing position.

Fixing Indicators

In an embodiment of a cladding reinforcement anchor, as shown in FIG. 5, first fixing indicator 530 on first leg 520 of cladding reinforcement anchor 510 can be in the form of an indentation. In this figure, the cladding reinforcement anchor 510 can be configured so that second leg 540 can extend from a second edge 550 of web 560 in substantially the opposite direction from first leg 520. A second fixing indicator 570, in the form of an aperture configured to receive a nail shank, can be provided in second leg 540. The apertures 530/570 can be indentations in the cladding reinforcement anchor 510 to provide a location to insert a nail or screw. The apertures 530/570 can help guide a nail or screw so that it can puncture the cladding reinforcement anchor 510 and drive into the cladding material 580 and the underlying structure to prevent movement of the cladding reinforcement anchor 510. When a nail or screw is placed on the apertures 530/570, the apertures 530/570 can direct the nail or screw into their center for proper attachment of the cladding reinforcement anchor 510. In some embodiments, the apertures 530/570 can be cut out of the cladding reinforcement anchor 510. In some embodiments, the apertures 530/570 can be depressions in the cladding reinforcement anchor 510. The apertures 530/570 can be various sizes and shapes, such as triangles, circles, and rectangles. The apertures 530/570 can be located in a straight line, as shown in FIG. 5. In some embodiments, the apertures 530/570 can be spaced apart in both the vertical and horizontal directions.

Because cladding material 580 can be in the form of a tapered plank where the upper edge is narrower than the lower edge, the angle at which first leg 520 extends from web 560 can be an acute angle, that is, less than 90°. The angle at which first leg 520 extends from web 560 can also be obtuse. In other configurations, the angle at which first leg 520 extends from web 560 can be about 90°. The angle between the web 560 and the first leg 520 can range from approximately 45° to approximately 135°. In some embodiments, the angle between the web 560 and the second leg 540 can be acute. Where the angle is acute, the cladding material 580 can stay relatively flush against the first leg 520 and the web 560. In other embodiments, the angle between the web 560 and the second leg 540 can be obtuse. The angle between the web 560 and the second leg 540 can range from approximately 45° to approximately 135°. Some slight deformation during installation may serve to increase release pressure required in the assembly, thereby providing additional resistance in the pressure zone by forming a resilient spring.

In an embodiment of a cladding reinforcement anchoring, as shown in FIG. 6, second fixing indicator 603 can be in the form of a surface marking on second leg 602 of cladding reinforcement anchor 601. Markings may be provided by a color difference, such as achieved by painting or painted on or may be result of exposure to radiation such as a laser beam, or may be in the form of a protrusion. The indicators 603 can be, for example, an X shape or a target shape. The indicators 603 can be located in any position on the second leg 602. The markings 603 can be useful because the marks can be slightly missed when attaching the reinforcement anchor 601 to the building substructure 605 with minimal negative consequences. In this embodiment, cladding material 604 can be attached to the building substructure 605. Subsequently, cladding reinforcement anchor 601 can be attached to the substructure 605 so that web 606 resists against upper edge 607 of cladding material 604 and first leg 608 extends across a portion of the face 609 of cladding material 604 at a predetermined distance sufficient to cover and protect fixing point 610 but not so far as to extend beyond the cladding manufacturer’s recommended overlap height. In some embodiments, the first leg 608 can have fixing indicators, similar to those described above, to direct attachment onto the cladding material 604.

Complex Cladding Reinforcement Anchor

In an embodiment of a cladding reinforcement anchor, as shown in FIG. 7, a cladding reinforcement anchor 700 can have a web 701 comprising first and second spaced apart edges 702, 703 respectively. The edges 702/703 can be configured to define a predetermined width 704 of web 701; in this instance the width 704 can be configured to match a profile on the upper edge of lower the cladding material 705 for locating the reinforcement anchor against the upper edge of a thin elongate cladding material 705. The edges 702/703 can have a thickness to allow the cladding reinforcement anchor 700 to wrap around a complex cladding material, such as the thin elongate cladding material 705. The thick edges 702/703 can allow for two U-shaped areas to be formed, thereby surrounding the cladding materials 705. An additional cladding material 706 can be used where the cladding reinforcement anchor 700 can also surround the second cladding material 706.
A first leg 708 is shown extending at a first predetermined angle from the first edge 702 of web 701. The angle can be optimized for locating said first leg 708 against a front face of the thin elongating cladding material 705. The first leg 708 can have at least one fixing indicator 707 for indicating at least one predetermined fixing position. A second leg 710 is shown extending at a second predetermined angle from the second edge 703 of web 701. The second leg 710 can have at least one fixing indicator 711 for locating at least one predetermined fixing position directly into the substructure 709. In this embodiment, the first leg 708 and the second leg 710 can extend in substantially opposite directions from web 701. In other embodiments, the first and second legs 708/710 can extend in substantially the same direction. The angles between the web 701 and the legs 708/710 can range from about 45° to 135°.

In the embodiment shown in FIG. 7, the cladding reinforcement anchor 700 can act as a base to hold an upper cladding material 706. The reinforcement anchor 700 can be configured to fit both the upper and lower cladding materials 705/706. In high wind applications, the force would need to remove both the cladding materials 705/706, which would increase the necessary force to pull the cladding materials 705/706 away from a substructure.

The cladding reinforcement anchor may be formed from any resilient material that may be formed into a thin section. Materials suitable for use include, but are not limited to, metals such as plain, stainless, galvanized, powder coated, painted or otherwise surface treated steels; polymers such as UHMWPE; and reinforced polymer composites, such as glass reinforced nylon, carbon fiber reinforced polymer, and the like. The cladding reinforcement anchor may be coated with materials. The coating can be used, for example, to prevent rusting of the cladding reinforcement anchors and thus increasing their use life and maintaining the aesthetics of the reinforcement anchors.

The configuration of the cladding reinforcement anchor can be thin enough so that it does not substantially disrupt the installation of the cladding material in line with the cladding material manufacturer’s recommendations. The cladding reinforcement anchor can have an increased thickness to increase strength with respect to high wind loads. In one implementation, the cladding reinforcement anchor has a thickness of about a 24 gauge.

Use of a cladding reinforcement anchor as herein described also can enable an increase in building sub-frame spacing in timber frame construction by improving the wind load capacity of an installation. For example, where a traditional installation may require fixing onto a timber subframe constructed using 400 mm centers, the cladding reinforcement anchor disclosed above can allow for installation of a cladding material on a timber subframe having 600 mm centers.

EXAMPLES

The following examples are provided to demonstrate the benefits of embodiments of a cladding reinforcement anchor. The examples are discussed for illustrative purposes and should not be construed to limit the scope of the disclosed embodiments.

A cladding material, HardiPlank® Lap Siding complying with ASTM C1186 Grade II Type A, was attached with embodiments of the above described cladding reinforcement anchor. The cladding material was ⅜ inch thick by 8.25 inch wide. The cladding clip was 2 inch wide. The first leg was ⅝ inch long and the second leg was ⅞ inch long. The thickness of the first leg was 24 gauge. The depth between the first leg and the second leg was ⅜ inch. The example show a comparison between a cladding material attached with a cladding reinforcement anchor and a cladding material attached with a nail. The results of the examples are shown in Table 1.

<table>
<thead>
<tr>
<th>Experiment Description</th>
<th>Fastener</th>
<th>Stud Spacing (in.)</th>
<th>Average Ultimate Load (lb)</th>
<th>Improvement over control (% increase)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control 1 16' OC</td>
<td>#9 x 1 ⅛” long Rock-on screw</td>
<td>16”</td>
<td>142.20</td>
<td>Versus Control 1, 78.0%</td>
</tr>
<tr>
<td>Reinforcement Anchor 1</td>
<td>#9 x 1 ⅛” long Rock-on screw</td>
<td>16”</td>
<td>253.18</td>
<td>Versus Control 1, 146%</td>
</tr>
<tr>
<td>Control 2 24' OC</td>
<td>8d, 2¼”L × 0.133” Ring Shank × 0.260” head</td>
<td>24”</td>
<td>72.83</td>
<td>Versus Control 2, 143%</td>
</tr>
<tr>
<td>Reinforcement Anchor 2</td>
<td>8d, 2¼”L × 0.133” Ring Shank × 0.260” head</td>
<td>24”</td>
<td>176.88</td>
<td>Versus Control 3, 55.2%</td>
</tr>
<tr>
<td>Control 3 24' OC</td>
<td>#9 x 1 ⅛” long Rock-on screw</td>
<td>24”</td>
<td>100.58</td>
<td>Versus Control 3, 55.2%</td>
</tr>
<tr>
<td>Reinforcement Anchor 3</td>
<td>#9 x 1 ⅛” long Rock-on screw</td>
<td>24”</td>
<td>156.07</td>
<td>Versus Control 3, 55.2%</td>
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</table>

Testing was done in accordance with ICC-ES Acceptance Criteria 90, hereby incorporated by reference in its entirety. Transverse load testing was conducted in accordance with ASTM E350-02(2010), hereby incorporated by reference in its entirety. Test frames, measuring 4 ft x 8 ft, were constructed with SPF #24-BTR, nominal 2 in. x 4 in. lumber spaced 16 in. on center and 24 in. on center. Frames were fastened together using 3 ½ in. 16 d common nails.

For each configuration, between one and three assemblies were constructed for testing in the negative wind load direction. The negative direction was the weakest orientation, therefore positive directrix load tests were not conducted.

The fiber-cement lap siding was installed to the test frames per the blind nailing method in the James Hardie HardiePlank product installation instructions, hereby incorporated by reference in its entirety. The cladding reinforcement anchor assemblies utilized the cladding reinforcement anchor with the fastener installed through the reinforcement anchor’s face.

Testing was conducted using the chamber method for uniformly distributed loading. Each test frame was secured in a horizontal uniformly distributed load testing apparatus. A sheet of polyethylene film was used in the construction of the test samples. For negative wind load testing, polyethylene film was placed loosely between the framing.
and the siding. The air within the test chamber was evacuated using a vacuum pump, inducing a uniformly distributed load to the sample.

[0059] A pre-load of one half of the test load was applied to each test assembly and held for 10 seconds. The load was released and after a recovery period of not less than 1 min nor more than 5 min. The load was then increased to prescribed load increments. The load was then released after 1 minute. This sequence was repeated a minimum of six times until a final ultimate load was attained. A visual examination of the specimens was made after the tests to determine the failure mode.

[0060] When compared to the control the 16 inch on center cladding reinforcement anchors improved the ultimate transverse load by 78%.

[0061] Two scenarios were tested over 24 inch on center framing. (1. Control 2 used a nail with 0.260 inch head diameter; the cladding reinforcement anchors improved the ultimate transverse load by 143%. The ultimate pressure was - 176 psi and (2. Control 3 used a screw with 0.375 inch head diameter; the cladding reinforcement anchors improved the ultimate transverse load by 55%. The ultimate pressure was - 156 psi.

[0062] It was unexpected to realize that HardiePlank siding, when blind nailed, with the cladding reinforcement anchor installed achieved ultimate transverse load pressures that are similar to face nailed assemblies. It is a common perception that blind nailing is not adequate for high wind regions and that face nailing must be utilized, however the test results indicate that when using cladding reinforcement anchors of certain preferred embodiments, it is possible to achieve face nailed performance from a blind nailed assembly.

[0063] It will be appreciated that the illustrated cladding reinforcement anchor provides a larger pressure zone, across which the load is distributed, in high wind load applications, thereby providing more secure attachment. Although the invention has been described with reference to specific examples, it will be appreciated by those skilled in the art that the invention may be embodied in many other forms.

[0064] Provided herein are various non-limiting examples of systems and methods for installing cladding assemblies. While the above detailed description has shown, described, and pointed out novel features of the invention as applied to various embodiments, it will be understood that various omissions, substitutions, and changes in the form and details of the device or process illustrated may be made by those skilled in the art without departing from the spirit of the invention. As will be recognized, the present invention may be embodied within a form that does not provide all of the features and benefits set forth herein, as some features may be used or practiced separately from others.

What is claimed is:

1. A reinforced cladding assembly comprising:
   a first cladding panel having an upper edge and a lower edge;
   a second cladding panel having an upper edge and a lower edge;
   a cladding reinforcement anchor, said cladding reinforcement anchor comprising a web having first and second spaced apart edges configured to define a predetermined width for locating the cladding reinforcement anchor against the upper edge of the first cladding panel, a first leg extending at a first predetermined angle from the first edge of the web, said first predetermined angle configured for locating said first leg against a front face of the first cladding material, a second leg extending at a second predetermined angle from said second edge of said web; and
   wherein the second cladding panel is positioned in a partial overlapping arrangement with the first cladding panel, wherein the lower edge of the second panel overlaps the upper edge of the first cladding panel in a manner such that the second cladding panel covers the cladding reinforcement anchor, wherein the first leg has a flat configuration so that no visible gap is created between the upper edge of the first cladding panel and the lower edge of the second cladding panel.

2. A reinforced cladding assembly according to claim 1 wherein the first leg comprises at least one fixing indicator for indicating at least one predetermined fixing position.

3. A reinforced cladding assembly according to claim 1 wherein said second leg extends from the second edge of the web in the same direction as the first leg.

4. A reinforced cladding assembly according to claim 1, wherein said second leg extends from the second edge of the web in a different direction to the first leg.

5. A reinforced cladding assembly according to claim 1, wherein said first predetermined angle is 45 and 135 degrees.

6. A reinforced cladding assembly according to claim 1, wherein said second predetermined angle is acute.

7. A reinforced cladding assembly according to claim 1, wherein said second predetermined angle is obtuse.

8. A reinforced cladding assembly according to claim 1, wherein said second leg comprises multiple fixing indicators.

9. A reinforced cladding assembly according to claim 1, wherein the second leg comprises a lip.

10. A reinforced cladding assembly according to claim 1, wherein at least one fixing indicator comprises an indentation.

11. A reinforced cladding assembly according to claim 1, wherein at least one fixing indicator comprises a surface marking.

12. A reinforced cladding assembly according to claim 1, wherein said cladding reinforcement anchor is formed from a resilient material selected from the group comprising metals, polymers, and reinforced polymer composites.

13. A reinforced cladding assembly according to claim 1, wherein a wind load resistance before failure is increased by at least about 55% as compared to the use of a screw without a cladding reinforcement anchor.

14. A reinforced cladding assembly according to claim 1, wherein a wind load resistance before failure is increased by at least about 72% as compared to the use of a screw without a cladding reinforcement anchor.

15. A reinforced cladding assembly according to claim 1, wherein a wind load resistance before failure is increased by at least about 140% as compared to the use of a screw without a cladding reinforcement anchor.

16. A fastening device according to claim 1, wherein an ultimate negative load allowed before failure is at least about 156 psi.

17. A cladding reinforcement anchor for attaching a cladding material to a substructure comprising:
   a web comprising first and second spaced apart edges, said edges configured to define a predetermined width configured to approximately match an upper edge of a thin elongate cladding material;
a first leg extending at a predetermined angle from said first edge of said web, said angle configured to locate said first leg against a front face of said thin elongate cladding material, wherein the first leg has a planar surface;
a second leg extending at a second predetermined angle from said first edge of said web, said angle configured to locate said second leg against a substructure; and
at least one fixing indicator located on said first leg configured to direct a fastener to an optimal location on said thin elongate cladding material;
wherein said cladding reinforcement anchor is sized and configured with a large surface area to prevent movement of said thin elongate cladding material during a high wind load application.

18. A method of installing a cladding assembly to a building structure, said method comprises:
positioning a first cladding material adjacent the building structure, said first cladding material having an elongate configuration;
attaching the first cladding material to the building structure via a fastener;
positioning a second cladding material adjacent to the first cladding material in a butt adjoining arrangement, said second cladding material having an elongate configuration; and
attaching a cladding reinforcement anchor to the first and second cladding materials by positioning the cladding reinforcement anchor at the butt adjoining area of the first and second cladding material, said cladding reinforcement anchor comprises a planar face having an area of at least 2 in\(^2\), wherein a first nail extends through the cladding reinforcement anchor and the first cladding material and a second nail extends through the second cladding material, thereby attach the first and second cladding materials to the building structure.