



166166

- 1 -

19 JUL 2002



G00002

A CLIP

5 The present invention relates to a clip for
fixing a roof or other cladding sheet to an underlying
structure.

10 The present invention also relates to a clip
assembly which includes, a strap that can be secured to an
underlying structure, and a plurality of retaining clips
mounted at spaced locations along the length of the strap.

15 Typically, cladding sheets for roofing and other
applications include a plurality of parallel ribs and flat
pan sections between the ribs. Typically, cladding sheets
are formed by roll-forming flat sheets.

20 It is known to secure cladding sheets to an
underlying structure, such as roof purlins, by nailing the
sheets directly to the underlying structure.

25 It is also known to secure cladding sheets to an
underlying structure by using clips that are secured to the
structure and are formed to extend into the ribs and engage
re-entrant portions of the ribs and thereby retain the
sheets to the clips. These clips are often preferred over
nails because they enable concealed fixing of cladding
sheets to an underlying structure.

30 There are a number of known retaining clips,
including a so-called WG clip disclosed in Australian
patent 457099 in the name of Comalco Limited, a clip
disclosed in UK patent application 2240793 in the name of
Stramit Industries Limited, and a clip disclosed in
35 Australian patent 685102 and other Australian patents and
patent applications in the name of Stramit Corporation.

19 JUL 2002

- 2 -

An object of the present invention is to provide an alternative clip.

According to one aspect of the present invention
5 there is provided a clip for retaining a cladding sheet to
an underlying structure, which sheet includes a plurality
of ribs extending along the sheet in a longitudinal
direction and each rib has a pair of opposed re-entrant
portions, which clip is adapted to be secured to the
10 underlying structure, and which clip includes:

(a) a platform; and

(b) a pair of retaining members which extend
15 outwardly and downwardly from opposite sides
of the platform and are relatively short
compared to the width of the platform that
separates the members, whereby, when the
clip is secured to the underlying structure,
20 the cladding sheet can be located on the
clip so that the retaining members contact
the re-entrant portions of one of the ribs
of the cladding sheet and retain the sheet
against the underlying structure.

The term "relatively short" is understood to mean
that the length of each retaining member, as measured from
a free end of the retaining member to the intersection of
the retaining member and the platform, is no more than the
30 width of the platform separating the retaining members.

Preferably the length of each retaining member is
less than 40% of the width of the platform separating the
retaining members.

35

The applicant has found that the relatively short
retaining members make it possible to balance the

19 JUL 2002

- 3 -

conflicting requirements of providing retaining members that:

- 5 (a) are sufficiently rigid to resist upward deflection in response to wind-generated uplift forces on the cladding sheet that could dislodge the sheet from the clip; and
- 10 (b) are sufficiently flexible to allow the retaining members to deflect resiliently inwardly to a certain extent during the process of locating the sheet onto the clip.

()

The above-described clip of the present invention is a significant improvement over the WG clip disclosed in Australian patent 457099. The WG clip is part of a cladding system which includes a particular rib profile of a cladding sheet and a mounting plate which, in use, resiliently biases the sheet upwardly against relatively long downwardly extending arms of the clip. The rib profile includes opposed upwardly and inwardly extending internal grooves which receive the lower ends of the downwardly extending arms of the clip. The inner wall of each groove is connected to the general plane of the sheet through a small radius curved section (identified by the numeral 26 in the drawings of the Australian patent). The combination of: (a) the resilient force applied by the mounting plate (which forces the inwardly and upwardly extending internal grooves of the rib against the downwardly extending arms of the clip); (b) the location of the downwardly extending arms of the clip; (c) the shape of the inwardly and upwardly extending internal grooves of the rib, and (d) the shape of the small radius curved section of the rib; is intended to provide a firm and stable roof-fixing which resists wind-generated uplift forces.

35 However, in practice, the combination of the rib profile, the mounting plate and the clip have not proven to be

19 JUL 2002

- 4 -

altogether effective. Moreover, it is not a straight-forward exercise to manufacture cladding sheets with the required rib profile.

5 Preferably each retaining member of the clip of the present invention is in the form of a tab.

 More preferably each tab is an extension of the platform.

10

 Preferably each retaining member has a free end that contacts one of the re-entrant portions of the rib when, in use, the clip is secured to the underlying structure and the cladding sheet is located on the clip.

15

 Preferably the length of each retaining member, as measured from the free end to the intersection of the retaining member and the platform, is between 2mm and 6mm.

20

 More preferably the length of each retaining member is 3mm.

 Preferably each retaining member is inclined downwardly at an angle of up to 75° to the horizontal.

25

 More preferably the angle of inclination is 30° to the horizontal.

 Preferably the width of the platform is 10-30mm.

30

 More preferably the width of the platform is 20-23mm.

35 Preferably the clip further includes a support member which, in use, when the clip is secured to the underlying structure and the cladding sheet is located on the clip, positions the retaining members in relation to

19 JUL 2002

- 5 -

the re-entrant portions of the rib and in relation to the underlying structure.

5 Preferably the support member, in use, positions the retaining members so that the free ends of the retaining members are well above the underlying structure.

10 Preferably the height of the re-entrant portions is at least 50% of the total height of the ribs.

11 Preferably the support member includes a pair of legs extending downwardly from opposite sides of the platform.

15 More preferably at least a major part of each leg is located in a plane that is transverse to the longitudinal direction of the ribs of the cladding sheet when, in use, the clip is secured to the underlying structure and the cladding sheet is located on the clip and
20 retained by engagement of the retaining members of the clip against the re-entrant portions.

25 In one embodiment it is preferred more particularly that each leg has sides that are bent out of the plane of the major part of the leg and extend towards the opposite leg.

30 In another, albeit not the only other embodiment, it is preferred more particularly that the support member includes a base and that the legs extend upwardly from the base.

35 In one embodiment it is preferred that the platform includes an opening which, in use, receives a screw or other fastener for fastening the clip via the platform to the underlying structure. Accordingly, the opening adapts the clip to be secured to the underlying

9 JUL 2002

- 6 -

structure.

In another, albeit not the only other embodiment, it is preferred that the base includes an opening which, in use, receives a screw or other fastener which fastens the clip via the base to the underlying structure.

With this embodiment, preferably the platform includes an opening that is aligned with the base opening and is sufficiently large so that a screwdriver or other fastening means can extend through the opening.

Preferably, the clip is formed by bending a flat metal sheet.

According to another aspect of the present invention there is also provided a clip assembly for retaining a cladding sheet to an underlying structure, which sheet includes a plurality of ribs extending along the sheet in a longitudinal direction and each rib has a pair of opposed re-entrant portions, which clip assembly includes:

- (a) a strap; and
- (b) a plurality of clips for engaging re-entrant portions of the ribs of the cladding sheet, which clips are detachably mounted to the strap at spaced locations along the length of the strap.

Preferably the clips described in paragraph (b) in the immediately paragraph include the clip described in the paragraphs that precede the immediately preceding paragraph.

Preferably the strap includes a plurality of

19 JUL 2002

- 7 -

slots and the clips include a plurality of outwardly extending locating members that can be positioned to extend into the slots so as to releasably locate the clips on the strap.

5

Preferably the strap includes a pair of parallel longitudinal ribs and the slots are in the ribs.

10 More preferably the locating members of each clip are in the form of tongues extending outwardly from the clip.

()
According to another aspect of the present invention there is provided a clip assembly for retaining a
15 cladding sheet to an underlying structure, which sheet includes a plurality of ribs extending along the sheet in a longitudinal direction and each rib has a pair of opposed re-entrant portions, which clip assembly includes:

20 (a) a strap; and

(b) a plurality of clips for engaging re-entrant portions of the ribs of the cladding sheet mounted to the strap at spaced locations
25 along the length of the strap;

wherein the strap includes a leading end section and a trailing end section, the leading and trailing end sections include means which facilitate locating in correct
30 alignment a successive strap to a strap that is already positioned on the underlying structure, and the locating means include an opening formed in one of the end sections and at least one upwardly extending tab formed in the other of the end sections, wherein the opening and the tab or
35 tabs are formed so that the opening of one strap can be positioned so that the tab or tabs of another strap extends through the opening and thereby locates the straps in

19 JUL 2002

- 8 -

correct alignment.

According to the present invention there is also provided a roof cladding system which includes:

- 5 (a) a plurality of the above-described clip assembly secured to an underlying structure; and
- 10 (b) a plurality of the above-described cladding sheet having re-entrant portions of the ribs of the cladding sheet retained by the clips of the clip assemblies.

Preferably the ribs of the cladding sheet are
15 formed so that the height of the re-entrant portions is at least 50% of the height of the ribs.

The present invention is described further by way of example with reference to the accompanying drawings, of
20 which:

Figure 1 is a perspective view of one embodiment of a clip and of a relatively short section of a clip assembly that incorporates the clip in accordance with the
25 present invention;

Figure 2 is a side elevation of one cladding sheet that can be mounted on the clip assembly shown in Figure 1;
30

Figure 3 is a side elevation of a longer section of the clip assembly shown in Figure 1 and of part of the cladding sheet shown in Figure 2 mounted to the two clips of the clip assembly shown in Figure 3;
35

Figure 4 is a cross-section along the line 4-4 of Figure 3;

19 JUL 2002

Figure 5 is a perspective view of another embodiment of a clip and a clip assembly that incorporates two of the clips;

5

Figure 6 is a perspective view of another embodiment of a clip and a clip assembly that incorporates two of the clips;

10

Figure 7 is a top plan view of another embodiment of a clip and clip assembly that incorporates the clip;

Figure 8 is an underside view of the clip shown in Figure 7;

15

Figure 9 is a side elevation of the clip shown in Figure 7 in the direction of the arrow A in Figure 7;

Figure 10 is a perspective view of the strap that forms part of the clip assembly shown in Figure 7; and

20

Figure 11 is an end view in the direction of the arrow B in Figure 7 which illustrates how the clip is located on the strap;

25

Figure 12 is a perspective view of another embodiment of a clip in accordance with the present invention;

30

Figure 13 is a perspective view of another embodiment of a clip in accordance with the present invention;

Figure 14 is a perspective view of a strap that forms part of another embodiment of a clip assembly that incorporates the clip shown in Figure 13; and

35

19 JUL 2002

Figure 15 is a perspective view of the clip assembly which incorporates the clip and the strap shown in Figures 13 and 14, respectively; and

5 Figure 16 is a perspective view of the end sections of another strap in accordance with the present invention.

10 The retaining clip 3 and the clip assembly, generally identified by the numeral 5, shown in Figures 1, 3 and 4 are formed to retain a cladding sheet, generally identified by the numeral 7 (Figures 2 and 4), to an underlying structure, such as roof purlins (not shown).

15 The cladding sheet 7 is roll-formed from a flat sheet and includes a leading edge 8, a trailing edge 10, a series of parallel ribs, generally identified by the numeral 11, and a series of pans 13.

20 As can best be seen in Figure 3, each rib 11 of the cladding sheet 7 includes an upper section 51 which separates two sides, generally identified by the numeral 53. Each side 53 includes a first section 55 which extends outwardly and downwardly from the upper section 51, a
25 second section 15 which extends downwardly and inwardly from the lower edge of the first section 55, and a third section 57 which extends downwardly and outwardly from the lower edge of the second section 15 and merges with the pan 13. The second sections 15 of each rib 11 are formed
30 approximately half-way between the pan 13 and the upper section 51 of the ribs 11. The second sections 15 of each rib 11 define opposed re-entrant portions of the rib 11 and are hereinafter referred to as "re-entrant portions 15". This form of rib is more straight-forward to manufacture
35 than the rib profile disclosed in Australian patent 457099.

As can best be seen in Figure 2, the leading and

19 JUL 2002

- 11 -

trailing edges 8, 10 of the cladding sheet 7 are formed as partially completed ribs 11 in order to facilitate interlocking of successive cladding sheets and, by way of example, include at least one re-entrant portion 15. These
5 partially completed ribs are hereinafter referred to as "leading edge formations" and "trailing edge formations".

The clip 3 shown in Figures 1, 3 and 4 is formed by bending a flat metal blank into the configuration shown
10 in the Figures.

With reference to these Figures, the clip 3 includes:

- 15 (a) a generally square, flat platform 17;
- (b) a pair of retaining members in the form of tabs 19 that extend downwardly and outwardly from one pair of opposite sides of the
20 platform 17 and are relatively short in length compared to the width W of the platform 17 that separates the tabs 19; and
- (c) a support member in the form of a pair of
25 legs 21 that extend downwardly from the other pair of opposite sides of the platform 17.

The platform 17 includes a central opening 25 for
30 a screw or other suitable fastener which can fasten the clip 3 to an underlying structure.

The clip assembly shown in Figures 1, 3 and 4 includes four clips 3 mounted to a strap 23. Figure 3 shows
35 a section of the clip assembly 5 which includes two of the four clips 3 mounted to the strap 23.

19 JUL 2002

- 12 -

The spacing of the clips 3 on the strap 23 is selected to be the same as the spacing of the leading edge formation 8, the ribs 11, and the trailing edge formation 10 of the cladding sheet 7.

5

It can readily be appreciated that the clip assembly 5 may be any suitable length and may include any suitable number of clips 3 at any required spacing.

10

The strap 23 shown in Figures 1, 3 and 4 is in the form of a shallow downwardly-facing channel and includes a leading end (not shown) and a trailing end (not shown) that are shaped in a conventional manner so that the leading end of a second strap to be positioned on the underlying structure can be located to overlap the trailing edge of a first strap that is secured to the structure and thereby generally align the two straps.

15

The strap 23 also includes openings (not shown) that are aligned with the openings 25 in the platforms 17 of the clips 3 so that the screws or other suitable fasteners can extend directly through the aligned openings and into the underlying structure.

20

The outwardly and downwardly extending tabs 19 of the clip 3 are formed so that, in use, a terminal end 27 of each tab 19 contacts the inside surface of one of the re-entrant portions 15 of a rib 11 or a leading edge formation 8 or a trailing edge formation 10 of a cladding sheet 7 when the sheet 7 is located on the clip 3 (as shown in Figure 3) and forces the re-entrant portions 15 and thereby the sheet 7 against the underlying structure. The terminal ends 27 of the tabs 19 are formed as a sharp edge to increase contact which resists disengagement of the tabs 19 and the re-entrant portions 15.

25

30

35

One feature of the clip 3 is that the length of

19 JUL 2002

- 13 -

each tab 19, as measured from the end 27 to the intersection of the tab 19 and the platform 17, is relatively short, preferably less than 40% of the width W of the platform separating the tabs 19. This relatively short tab length makes it possible to balance the conflicting requirements of providing the tabs with:

- (a) sufficient rigidity to resist deflection in response to wind-generated uplift forces that could cause release of the cladding sheet 7 from the clip 3; and
- (b) with sufficient flexibility to enable the tabs 19 to deflect inwardly to a certain extent during the process of positioning of the cladding sheet 7 on the clip 3.

As can best be seen in Figure 4, each leg 21 includes a major part 22 that is located in a plane that is transverse to the ribs 11 of the cladding sheet 7 when, in use, the clip 3 is secured to the underlying structure and the cladding sheet 7 is located on the clip 3. Forming the clip 3 so that the major part of each leg 21 is transverse to the ribs 11 provides the clip 3 with structural rigidity and is an important feature of the embodiment of the clip 3 on this basis.

As can best be seen in Figure 1, each leg 21 also includes inwardly-turned sides 31 that extend parallel to the ribs 11 of the cladding sheet 7 when, in use, the cladding sheet 7 is located on the clip 3. The in-turned sides 31 further contribute to the structural rigidity of the clip 3.

The clip 3 shown in Figures 1, 3 and 4 is formed as a single component by cutting a flat sheet of steel strip to a required profile and then bending the strip.

19 JUL 2002

Accordingly, manufacture of the clip 3 is a relatively straight-forward exercise compared to many prior art clips.

In use, a required number of the clip assemblies 5 shown in Figures 1, 3 and 4 are secured to the underlying structure by screws or other fasteners positioned to extend through the openings 25 in the clips 3 and the aligned openings in the straps 23. Thereafter, cladding sheets 7 are successively placed over the underlying structure in overlapping relationship and successively the leading edge formation 8, the ribs 11, and the trailing edge formation 10 of each of the sheets 7 are pressed onto the clips 3 so that the leading edge formation 8, the ribs 11, and the trailing edge formation 10 deflect outwardly and the retaining tabs 19 deflect inwardly and allow the leading edge formation 8, the ribs 11, and the trailing edge formation 10 to be snap fitted over the clips 3 with the tabs 19 contacting the re-entrant portions 15 and thereby retaining the sheets 7 to the underlying structure.

20

The retaining clip 3 and the clip assembly 5 shown in Figure 5 are very similar to the clip 3/clip assembly 5 shown in Figures 1, 3 and 4 and the same reference numerals are used to indicate the same components.

25

One difference is that the clip 3 shown in Figure 5 includes inwardly pressed ribs 61 which provide the clip 3 with rigidity and make it possible to form the clip from a thinner metal blank than would otherwise be the case.

30

Another difference is that the strap 23 of the clip assembly 5 shown in Figure 5 includes a central lengthwise extending rib 63 which provides rigidity to the strap 23 and makes it possible to use thinner sheet metal to form the strap 23.

35

19 JUL 2002

- 15 -

The retaining clip 3 and the clip assembly 5 shown in Figure 6 are very similar to the clips 3/clip assemblies 5 shown in Figures 1, 3, 4 and 5 and the same reference numerals are used to indicate the same components.

The main difference relates to the construction of the clips 3 shown in Figure 6. The clips 3 shown in Figures 1, 3, 4 and 5 are made as single components by bending a flat metal blank into the configuration shown in the Figures. Each clip 3 shown in Figure 6 is made from 2 separate components. One component includes the platform 17 and the legs 21 with inwardly turned sides 31 and is formed by bending a flat sheet blank. The second component is a sheet 71 of spring steel with a central hole that is positioned underneath the platform 17 and extends from opposite sides of the platform 17 and forms the retaining tabs 19. The spring steel sheet 71 is held in position by being sandwiched between the platform 17 and upper edges of the inwardly turned sides 31 of the legs 21.

The retaining clip 3 and the clip assembly 5 shown in Figures 7 to 11 are very similar to the clips 3/clip assemblies 5 shown in Figures 1, 3, 4 and 5 and the same reference numerals are used to indicate the same components.

One difference is that the clip 3 has two feet 81 and the feet 81 form part of the support member of the clip. Forming the clip 3 with feet 81 means that it is not necessary to provide the legs 21 with inturned sides 31 (as is the case with the clips shown in Figures 1, 3, 4 and 5) to provide the required structural rigidity of the clip.

As with the clips 3 shown in Figures 1, 3, 4 and 5, the clip 3 is formed as a single component by cutting a single flat sheet of steel strip to a required profile and

19 JUL 2002

- 16 -

then bending the strip into the shape shown in the Figures,
ie to form the platform 17 and the legs 21 of the clip 3.
In the case of the clip 3 shown in Figures 7 to 11 the free
ends of the bent strip are also bent inwardly so that the
5 free ends face each other and thereby form the feet 81.

Another difference is that the clip 3 and the
strap 23 are secured to an underlying structure by a screw
or other fastener acting against the feet 81 instead of the
10 platform 17 - as is the case with the clips shown in
Figures 1, 3, 4 and 5. The feet 81 are formed to define a
central opening 83 (Figures 7 and 8) which, in use,
receives a screw or other fastener that secures the clip
and the strap 23 to an underlying roof support structure.
15 In this context, the strap 23 has a series of spaced apart
openings 91 and, in use, the clip 3 is positioned on the
strap 23 so that the opening 83 and one of the openings 91
are aligned. Further, the opening 25 in the platform 17 of
the clip is formed to be sufficiently wide to allow a
20 screwdriver to be inserted through the opening 25.

Another difference is that the clip 3 and the
strap 23 are formed so that the clip 3 can be detachably
mounted to the strap 23. As a consequence, a strap 23 and a
25 plurality of the clips 3 can be assembled together to form
a clip assembly either at a manufacturing location or on-
site after the clips 3 and the strap 23 have been
separately transported to the building site. The latter
option is an advantage in terms of efficient
30 transportation. In addition, making the clips 3 detachable
from the strap 23 is an advantage because it is possible to
conveniently replace damaged clips 3.

In the embodiment shown in Figures 7 to 11 the
35 clip 3 has two locating tongues 85 extending outwardly from
each foot 81 that cooperate with slots 87 in the strap 23
to detachably mount the clip 3 on the strap 23. In this

- 17 -

connection, the strap 23 has ribs 89 extending along the sides of the strap. The ribs 89 are formed by deforming the strap 23 out of the major plane of the strap. The slots 87 are formed in the inwardly facing sides 93 of the ribs 89. The strap 23 and the clip 3 are formed so that locating the tongues 85 in the slots 87 is achieved via a snap fit action - as illustrated in Figure 11. In particular, as can be seen in Figures 11 and 12, the feet 81 of the clip 3 are separated by a small gap G at a centreline of the clip and the gap G permits resilient inward movement of the legs 21 which facilitates snap fitting of the tongues 85 in the slots 87.

In the embodiment shown in Figure 12 the clip 3 is formed with a single centrally located tongue 85 extending outwardly from each foot 81 of the clip 3.

The retaining clip 3 and the clip assembly 5 shown in Figures 13 to 15 are very similar to the clip 3 and clip assembly 5 shown in Figures 7 to 11 and the same reference numerals are used to indicate the same components.

In this context, the clip 3 includes the above-described feet 81 and the locating tongues 85 extending from the feet 81 which can be snap-fitted into the slots 87 in the strap 23 to releasably mount the clip 3 to the strap 23.

One feature of the clip assembly 5 shown in Figures 13 to 15 which is not disclosed in the other embodiments is that the leading end section 95 and the trailing end section 97 of the strap 23 include means which facilitate locating a successive strap 23 to a strap 23 that is already positioned on an underlying structure in correct alignment.

19 JUL 2002

The locating means include a slot 99 in the leading end section 95 of the strap 23 and a pair of opposed upwardly extending tabs 101 in the trailing end section 97 of the strap 23. It can be appreciated from Figure 13 that with this arrangement a successive strap 23 can be positioned on an already-positioned strap 23 (the strap 23 on the left side of the figure) by positioning the successive strap 23 in relation to the already-positioned strap 23 so that the tabs 101 at the trailing end section 97 of the already-positioned strap 23 extend through the slot 99 in the leading end section 95 of the successive strap 23. This facilitates alignment of the straps 23. When so positioned, if required the tabs 101 may be folded outwardly and downwardly onto the underlying surface of the successive strap 23 to hold the two straps together. It is noted that this method of locating the straps 23 may be carried out with or without the clips 3 snap-fitted on the straps 23. It is also noted that the positions of the slots 99 and tabs 101 are interchangeable and the slots 99 may be at the trailing end sections 97 and the tabs 101 may be at the leading end section of the straps 23.

In the embodiment shown in Figure 16 the means which facilitate locating a successive strap 23 to a strap 23 that is already positioned on an underlying structure in correct alignment includes:

- (a) a slot 107 in the leading edge section 95 in the strap 23; and
- (b) tab 109 in the trailing edge section 97 in the strap 23.

In use, the locating means shown in Figure 16 can be brought into engagement with each other by moving the successive strap 23 in the downward and forward directions as indicated by the arrow in the Figure so that the opening

19 JUL 2002

- 19 -

107 in the strap 23 is received in the hook-shaped tab 109
of the already-positioned strap 23. It can be appreciated
that with this form of locating means, when the successive
sheet is layed flat on the underlying structure, relative
5 lengthwise movement of two straps 23 is possible to allow
alignment of the openings 91.

Many modifications may be made to the preferred
embodiment of the present invention described above without
10 departing from the spirit and scope of the invention.

() For example, whilst the embodiments of the clip 3
shown in the Figures includes retaining tabs 19 that are
essentially planar members that have the same width as that
15 of the sides of the platform 17 from which the tabs 19
extend, it can readily be appreciated that the present
invention is not so limited and extends to any suitable
form of retaining member.

20 Furthermore, whilst the embodiments of the clip 3
shown in the figures includes legs 21, it can readily be
appreciated that the present invention is not limited to
this arrangement and extends to any suitable form of
support member.

() 25 Furthermore, whilst not shown, the clip 3 may
include a member, for example, a post, extending upwardly
from the platform 17 which in use extends into the rib 11
and is adapted to contact the rib 11 and resist
30 disengagement of a sheet 7 located on the clip in response
to uplift forces. The member may be formed by cutting and
folding sheet material that is initially pressed when
forming the opening 25. For example, the post may be in
the form of an upturned lip formed from the downwardly
35 extending margin of the opening 25 shown in Figure 12.

19 JUL 2002

- 20 -

CLAIMS:

1. A clip for retaining a cladding sheet to an
5 underlying structure, which sheet includes a plurality of
ribs extending along the sheet in a longitudinal direction
and each rib has a pair of opposed re-entrant portions,
which clip is adapted to be secured to the underlying
structure, and which clip includes:
- 10 (a) a platform;
- (b) a pair of retaining members which extend
outwardly and downwardly from opposite sides
15 of the platform and are relatively short
compared to the width of the platform that
separates the members, whereby, when the
clip is secured to the underlying structure,
the cladding sheet can be located on the
20 clip so that the retaining members can be
positioned to contact the re-entrant
portions of one of the ribs of the cladding
sheet and retain the sheet against the
underlying structure; and
- 25 (c) a support member which, in use, positions
the platform and the retaining members so
that, in use, the retaining members can be
positioned to contact the re-entrant
30 portions of one of the ribs of the cladding
sheet and retain the sheet against the
underlying structure, the support member
including a pair of legs extending
downwardly from the platform, and at least a
35 major part of each leg being located in a
plane that is transverse to the longitudinal
direction of the ribs of the cladding sheet

- 21 -

when, in use, the clip is secured to the underlying structure and the cladding sheet is located on the clip.

5 2. The clip defined in claim 1 wherein the length of each retaining member is less than 40% of the width of the platform separating the retaining members.

10 3. The clip defined in claim 1 or claim 2 wherein each retaining member is in the form of a tab.

4. The clip defined in claim 3 wherein the tab is an extension of the platform.

15 5. The clip defined in any one of the preceding claims wherein each retaining member has a free end that contacts one of the re-entrant portions of the rib when, in use, the clip is secured to the underlying structure and the cladding sheet is located on the clip.

20 6. The clip defined in claim 5 wherein the length of each retaining member, as measured from the free end to the intersection of the retaining member and the platform, is between 2mm and 6mm.

25 7. The clip defined in claim 6 wherein the length of each retaining member is 3mm.

30 8. The clip defined in claim 7 wherein each retaining member is inclined downwardly at an angle of up to 75° to the plane of the platform.

9. The clip defined in claim 8 wherein the angle of inclination is 30°.

35 10. The clip defined in any one of the preceding claims wherein the width of the platform is 10-30mm.

19 JUL 2002

- 22 -

11. The clip defined in claim 10 wherein the width of the platform is 20-23mm.

5 12. The clip defined in any one of the preceding claims wherein the support member, in use, positions the free ends of the retaining members well above the underlying structure.

10 13. The clip defined in any one of the preceding claims wherein the height of the re-entrant portions is at least 50% of the total height of the ribs.

()
15 14. The clip defined in any one of the preceding claims wherein each leg has sides that are bent out of the plane of the major part of the leg and extend towards the opposite leg.

20 15. The clip defined in any one of the preceding claims wherein the support member includes two feet and the legs extend upwardly from the feet.

25 16. The clip defined in any one of the preceding claims further includes a member extending upwardly from the platform for resisting release of overlapping cladding sheets from the clip in response to uplift forces.

30 17. A clip assembly for retaining a cladding sheet to an underlying structure, which sheet includes a plurality of ribs extending along the sheet in a longitudinal direction and each rib has a pair of opposed re-entrant portions, which clip assembly includes:

35 (a) a strap having a plurality of slots; and

(b) a plurality of clips for engaging re-entrant portions of the ribs of the cladding sheet,

19 JUL 2002

5 the clips having a plurality of outwardly
extending locating members that can be
positioned to extend into the slots so as to
releasably locate the clips on the strap at
spaced locations along the length of the
strap.

10 18. The clip assembly defined in claim 17
includes a plurality of the clip defined in any one of
claims 1 to 18.

15 19. The clip assembly defined in claim 17 or
claim 18 wherein the strap includes a pair of parallel
longitudinal ribs and the slots are formed in the ribs.

20 20. The clip assembly defined in claim 17 or
claim 18 wherein the locating members of each clip are in
the form of tongues extending outwardly from the clip.

25 21. A clip assembly for retaining a cladding
sheet to an underlying structure, which sheet includes a
plurality of ribs extending along the sheet in a
longitudinal direction and each rib has a pair of opposed
re-entrant portions, which clip assembly includes:

- 30 (a) a strap; and
- (b) a plurality of clips for engaging re-entrant
portions of the ribs of the cladding sheet
mounted to the strap at spaced locations
along the length of the strap;

35 wherein the strap includes a leading end section and a
trailing end section, the leading and trailing end
sections include means which facilitate locating in
correct alignment a successive strap to a strap that is
already positioned on the underlying structure, and the

19 JUL 2002

locating means include an opening formed in one of the end sections and at least one upwardly extending tab formed in the other of the end sections, wherein the opening and the tab or tabs are formed so that the opening of one strap can be positioned so that the tab or tabs of another strap extends through the opening and thereby locates the straps in correct alignment.

22. The clip assembly defined in claim 21 wherein the tab is hook-shaped whereby in use the successive strap can be located on the already positioned strap by moving the successive strap downwardly and forwardly relative to the already positioned strap so that the opening in the successive strap is received by the hook-shaped tab.

23. A roof cladding system which includes:

(a) a plurality of the clip assembly defined in any one of claims 17 to 22 secured to an underlying structure; and

(b) a plurality of cladding sheets retained by the clips of the clip assemblies.