

5

10 The invention relates to a lining board having at its edges
flat marginal strips that project perpendicularly to the
lining skin, the cross section of the marginal strips running
from the lining skin to a free edge, said cross-sectional
15 course being directed away from the lining skin at least at
the free edge and said free edge limiting the greatest width
of the marginal strip, in the position of use the marginal
strips having lying indirectly or directly thereagainst the
marginal strips of adjacent lining boards and being engaged
20 by connecting means for fastening together the marginal
strips lying against one another, wherein the area arranged
between the two mutually aligned longitudinal edges of the
marginal strip that act as a support for the marginal strip
of the adjacent lining board extends back relative to these
longitudinal edges in a direction towards the middle of the
25 lining board.

Such a lining board where the marginal strips of aligned and
contiguous lining boards lie directly against one another is
known from German Patent Specification No. 21 37 505. Bolts
30 traversing keyhole-like openings in the marginal strips serve
as the connecting means for fastening together the marginal
strips lying against one another and have a stop projection
and a counter-stop arranged in spaced relationship thereto.

German Patent Specification No. 24 03 325 has disclosed comparable lining boards where the marginal strips of adjacent lining boards lie indirectly against one another, that is to say, intermediate parts or spacers are provided between them, while compensating elements might also be provided between such marginal strips of mutually aligned, adjacent lining boards.

It is also known from US-A-28 70 516 that the area arranged between the two mutually aligned longitudinal edges of the marginal strip that act as a support for the marginal strip of the adjacent lining board extends back relative to these longitudinal edges in a direction towards the middle of the lining board. In this document the aim is rather for frictional connection by pressing together the arched marginal strips.

In these known solutions, the marginal strips are plane to enable them to lie tightly against one another or to enable intermediate parts to be inserted. However this results in that the stiffness of these marginal strips is limited and hence the lining boards can have only a limited loading capacity.

It is therefore also known, e.g. from DE-A-27 16 864, to use hollow sections instead of flat marginal strips. Hollow sections have a greater stiffness, but they also lead to marginal strips with large cross sections and correspondingly elaborate connecting means, as well as to considerably higher weights of the lining boards. In the case of the profiled marginal strip according to DE-A-27 16 864, a C-shape has been selected as the cross section, wherein that free edge of the section which is remote from the lining skin is directed towards the latter and hence does not limit the greatest width of this marginal section.

The object underlying the invention is therefore to provide a lining board of the kind mentioned at the outset, in which the marginal strips may be of flat material, but one can nevertheless attain a high stiffness accompanied by good sealing of marginal strips lying against one another.

This object is accomplished in that in the recessed area is formed at least one flute or bead that extends in the opposite direction and is open towards the centre of the lining board.

The solution is hence based on the finding that, as is already known from hollow sections, it is sufficient for sealing the the marginal strips lying against one another if in each case two edge areas are available as sealing surfaces and supporting surfaces. Therefore considerably greater stiffness can be imparted to the marginal strip of flat material through the described shaping of its crosspiece, as compared with a marginal strip plane throughout. In addition the further advantage ensues that clips or clamps can have their clamping jaws applied to the beads in the manner as is also known when the marginal strips are composed by hollow sections. Hence these marginal strips presenting a stiffened cross-sectional profile but nevertheless consisting of flat material can be engaged by clamps or clips as the connecting means, the latter having the advantage that they permit of being applied to virtually any locations in the course of the marginal strips, that they also allow a high clamping force and thereby enable good sealing of the marginal strips lying against one another or of interposed compensating elements or the like. Nevertheless the total weight of the lining board can be kept lower, because the substantially heavier marginal sections are replaced by flat marginal strips which present greater stiffness than plain ones.

It is particularly advantageous if the bead devised for engagement of a clip or clamp and the outer surface thereof situated at the outer periphery of the lining board is at a distance to a plane contacting the two corresponding outer surfaces of the longitudinal edges of the strip. It is sufficient, but at the same time also advantageous, if the distance of the outer surface of the bead from the plane of the longitudinal edges of the strip corresponds approximately to or is greater than the elastic deformability of the strip when being clamped to a neighbouring strip. These measures hence prevent that when such marginal strips lie against one another the outer surfaces of the beads are supported against one another and the sealing surfaces proper fail to be pressed together sufficiently. Rather, one achieves that the entire clamping or connecting force is transferred to the marginal strips at their mutually aligned longitudinal edges lying against one another. The stiffer and also thicker the cross sections of the marginal strips are, the smaller this distance will be between the outer surface of the bead and the plane of the outer surfaces of the longitudinal edges. The cross-sectional thickness of the marginal strips may be, for example, about 1/2 cm to about 3/4 cm and particularly about 6 mm. Given a cross-sectional thickness of about 6 mm, a distance of the outer surface from the plane of the longitudinal edges in the order of about 1/2 to 1 mm is sufficient in order to achieve on the one hand the desired firm contact pressure of the aligned longitudinal edges and sealing surfaces of the marginal strips and on the other hand to allow for the elastic deformation under the influence of the clamping force.

It is suitable for the exterior surfaces of the two longitudinal edges of the marginal strips to be plane and mutually aligned and the width at least of the longitudinal

edge closer to the lining skin may approximate at least the thickness of this lining skin, however both longitudinal edges may suitably be of the same width in order that altogether a symmetrical cross section ensues and the bead can also be arranged in the centre of the marginal strips.

The area of the marginal strips which extends back in relation to the longitudinal edges in a direction towards the middle of the lining board may be plane except for the bead. This area is thereby available in order to allow, for example, further stiffening strips to butt and to be welded to the marginal strips. In addition, a sleeve for a tie could in this way be fixed to the inside or inner surface of the marginal strips. Further, in this way supports or brackets could be attached well to the marginal strips.

The bead arranged in the longitudinal direction of the marginal strip - particularly in the centre thereof - may run uninterrupted and particularly with uniform cross section throughout the length of the marginal strip. Therefore a clamping device can be applied to virtually any location of the marginal strip. Further, in this way the marginal strips can be made from an originally, plane, flat material in a continuous profiling process.

Holes traversing the marginal strips, e.g. for attaching connecting bolts or the like, may be provided in the area of the bead. With the use of such connecting bolts, either adjacent lining boards could be fastened together or accessories such as working platforms, shores and the like could be coupled to marginal strips lying against one another of adjacent lining boards. The arrangement of these coupling holes in the area of the bead has the advantage that the clamping forces applied in the longitudinal direction of the bolts are also introduced at the beads provided for them.

The holes provided in the area of the beads might have a circular cross section and their diameter might in particular approximate the greatest width of the bead, so that the walls of the holes also traverse the lateral boundaries of the bead. Therefore, for example, the head of a connecting bolt and also a nut cooperating with a threaded stud could in each rest against the surface which faces the centre of the formwork and forms part of that area of the marginal strips which recedes at the side of the bead.

The transitions from the longitudinal edges to the central area of the marginal strip and/or the lateral boundaries of the bead may run at a slant relative to the cross-sectional contour of the marginal strip, for example at an angle of about 45 degrees. This produces not only a good stiffening, but also permits the desired shaping of the cross section of the marginal strip, without the danger of damage or weakening during the profiling process.

Altogether, a lining board of relatively low weight ensues, because its marginal strips can consist of flat material, it nevertheless being possible for great forces to be transferred and for clips or clamping devices to be used for connecting adjacent lining boards. This signifies that the advantages of lining boards with flat marginal strips are combined with the advantages displayed by lining boards with marginal strips composed of hollow sections, dispensing with a considerable increase in weight.

An exemplified embodiment of the invention is described more closely below with reference to the drawings, in which

Fig. 1 is a diagrammatic representation of a rear view of a lining board according to the invention,

including profiled marginal strips of flat material running round the edges and transverse stiffening sections arranged inbetween, and

5 Fig. 2 is a section through mutually opposed marginal strips of the lining board with an adjacent lining board fastened thereto, the marginal strips in contact being held together by a clamping device or clip.

10

A lining board 1 has running round its edges flat marginal strips 3 that project perpendicularly to its lining skin 2, in the position of use the marginal strips having lying indirectly or - according to Fig. 2 - directly thereagainst
15 the corresponding marginal strips 3 of adjacent lining boards 1 and being connected with the aid of fasteners, in the exemplified embodiment with the aid of a clamping device 4.

20 It is clear particularly with reference to Figure 2 that the cross section of the marginal strips 3 runs from the lining skin 2 to a free longitudinal edge 7, this free edge 7 limiting the greatest width of the marginal strip 3, hence being directed away from the lining skin 2.

25 The cross sections of the marginal strips 3 in Fig. 2 illustrate that the area 5 arranged between the two mutually aligned longitudinal edges 6 and 7 of the marginal strip 3 that act as a support for the marginal strip 3 of the adjacent lining board 1 extends back relative to these
30 longitudinal edges in a direction towards the middle of the lining board 1, and that in that recessed area 5 is formed a flute or bead 8 that extends in the opposite direction and that is open towards the centre of the lining board. Figure 2 illustrates that in each case a bead 8 of a marginal strip 3
35 cooperates with the bead 8 of the marginal strip 3 of the

adjacent lining board 1, when the clip 4 engages these beads 8 to connect the lining boards 1. Through the clamping force, the confronting outer surfaces 8a of the beads 8 are brought closer to one another or are even pressed together. In the starting position, however, hence without deformation through the clamping force, the outer surfaces are at a distance to a plane contacting the two outer surfaces of the longitudinal edges 6 and 7 of the strips 3. It is thereby ensured that in the position of use the longitudinal edges 6 and 7 of the strips 3 come into contact with one another and lie tightly against one another and not that premature contact of the outer surfaces 8a of the beads 8 prevents such a tight joint of the longitudinal edges 6 and 7. In addition, by way of the resilience of the marginal strips 3, a corresponding pressure force can be generated and transferred in the area of the longitudinal edges 6 and 7.

It is hence suitable if the distance A of the outer surface 8a of the bead 8 from the plane E of the longitudinal edges 6 and 7 of the strip 3 corresponds approximately to or is even greater than the elastic deformability of the marginal strip 3 when being clamped to an adjacent strip, so that contrary to the representation of Figure 2 the outer surfaces 8a of marginal strips 3 lying against one another then do not come into contact.

Figure 2 illustrates that the exterior surfaces of the two longitudinal edges 6 and 7 of the marginal strip 3 are plane, namely lie in plane E, and are mutually aligned. The width at least of the longitudinal edge 6 closer to the lining skin 2 approximates the thickness of this lining skin 2, so that the recessed area 5 can begin directly at the rear of the lining skin 2, but the lining skin can reach up to the inside of the longitudinal edge 6, except for a sealing joint. In the exemplified embodiment it is even the case that both

longitudinal edges 6 and 7 are of the same width, so that an essentially symmetrical configuration of the marginal strip 3 stiffened by the recessed area 5 on the one hand and by the bead 8 on the other hand is formed if - as contemplated in the exemplified embodiment - the bead 8 which is arranged in the direction of the longitudinal expanse of the marginal strip 3 and runs uninterrupted and with uniform cross section throughout the length of the marginal strip 3 is arranged in the centre of the cross section of the marginal strip 3. The area 5 of the marginal strips 3 which extends back in relation to the longitudinal edges 6 and 7 in a direction towards the middle of the lining board 1 is plane except for the bead 8. Therefore, when butting against these areas 5, stiffening sections 9 arranged transversely to the marginal strips 3 find a good support and a correspondingly wide area for the provision of a weld seam. Further, in this way a clip 4 can be pushed over marginal strips 3 lying together, without it being necessary for the parting travel of its clamping jaws 10 and clamping pieces 11 to be too great. The marginal webs 3 may be traversed, particularly in the area of their bead 8, by holes 12 at which fastening bolts may be arranged instead of or in addition to the clip 4. While the clip 4 permits a fastening at virtually any area of the marginal strips 3, fastening bolts might be provided at preselected locations with the aid of holes. In addition, accessories such as brackets or supports can be fixed with such fastening bolts.

It is indicated in Fig. 2 that the holes 12 provided in the area of the beads 8 have a circular cross section and their diameter corresponds approximately to the greatest width of the beads 8, so that the walls of the holes also traverse the lateral boundaries 8b of the beads 8. Hence the plane zones which form part of the recessed areas 5 and are adjacent to

the holes 12 are available as a support for a head or a nut or a projection of a fastening bolt.

5 The transitions from the longitudinal edges 6 and 7 to the central area 5 of the marginal strip 3 and the lateral boundaries 8b of the bead 8 are at a slant relative to the cross-sectional contour of the marginal strip 3, in the exemplified embodiment at an angle of about 45 degrees. This has the result that the transitions in each case departing from longitudinal edges 6 lying against one another together form approximately a right angle, signifying a good compromise from the viewpoint of metal forming on the one hand and from the viewpoint of introducing clamping forces on the other hand.

15 Altogether, a lining board 1 of great stiffness ensues in which the marginal strips 3, although made of flat material, also display great stiffness by virtue of their cross-sectional shape, while being of relatively low weight. At the same time, a clip or clamp 4 of relatively small opening capacity is sufficient in order to be able to connect the marginal strips. However, in an advantageous way, the bead 8 enhancing the stiffening allows such a clamp 4 to be applied, so that the holes 12 which in principle are possible could even be dispensed with. Further, with the aid of the clamps 4, the interconnection can be established at virtually any locations of the contacting marginal strips 3. Hence the advantages of the relatively low weight of the marginal strips 3 consisting of flat material are combined with the possibility of being able to apply clamps at any points of contact, hence of not being dependent on given hole spacings. Consequently on the one hand the beads 8 have the function of increasing the stiffness of the marginal strips 3 and on the other hand they form a convenient point of engagement for the clamp 4.

In order to reduce its weight, a lining board 1 has at its edges, instead of hollow sections, flat marginal strips 3 that project perpendicularly to the lining skin 2 and that have in order to increase their stiffness, an area 5 that extends back to the middle of the lining board 1, arranged between their two mutually aligned longitudinal edges 6, 7 that act as a support for the marginal strip 3 of an adjacent lining board 1. In that recessed area 5 is formed a flute or bead 8 that extends in the opposite direction and that is open towards the centre of the lining board. A flat, highly resistant marginal strip 3 is thus obtained, whose bead 8 may be engaged by usual clamps or clips 4, dispensing with heavy-weight hollow marginal sections. The cross-sectional thickness of the marginal strips 3 may be, for example, about 1/2 cm or 0.6 cm and the distance of the outer surface 8a of the bead 8 from the plane E may be between 1/2 and 1 mm, possibly also somewhat more.

5

Patent Claims

1. A lining board (1) having at its edges flat marginal strips (3) that project approximately perpendicularly to the lining skin (2), the cross section of said marginal strips running from the lining skin (2) to a free edge, said cross-sectional course being directed away from the lining skin (2) at least at the free edge and said free edge limiting the greatest width of the marginal strip (3), in the position of use the marginal strips (3) having lying indirectly or directly thereagainst the marginal strips (3) of adjacent lining boards and being engaged by connecting means for fastening together the marginal strips (3) lying against one another, wherein the area (5) arranged between the two mutually aligned longitudinal edges (6,7) of the marginal strip (3) that act as a support for the marginal strip (3) of the adjacent lining board (1) extends back relative to said longitudinal edges (6,7) in a direction towards the middle of the lining board (1), characterized in that in said recessed area (5) is formed at least one flute or bead (8) that extends in the opposite direction and that is open towards the centre of the lining board.
2. A lining board as claimed in claim 1, characterized in that bead (8) serving or devised for engagement of a clip or clamp (4) and the outer surface (8a) thereof situated at the outer periphery of the lining board (1) is at a distance (A) to a plane (E) contacting the two



corresponding outer surfaces of the longitudinal edges (6, 7) of the marginal strip (3).

- 5 3. A lining board as claimed in claim 1 or claim 2,
characterized in that the distance (A) of the outer
surface (8a) of the bead (8) from the plane (E) of the
longitudinal edges (6, 7) of the marginal strip (3)
corresponds approximately to or is greater than the
elastic deformability of the marginal strip (3) when
10 being clamped to a neighbouring marginal strip (3).
- 15 4. A lining board as claimed in any one of claims 1 to 3,
characterized in that the exterior surfaces of the two
longitudinal edges (6, 7) of the marginal strip (3) are
plane and in alignment and the width at least of the
longitudinal edge (6) closer to the lining skin (2)
approximates at least the thickness of said lining skin
(2), particularly that both longitudinal edges (6, 7) are
of the same width.
- 20 5. A lining board as claimed in any one of claims 1 to 4,
characterized in that the area (5) of the marginal strips
(3) that extends back in relation to the longitudinal
edges (6, 7) in a direction towards the middle of the
lining board (1) is plane except for the bead(s) (8).
- 25 6. A lining board as claimed in any one of claims 1 to 5,
characterized in that the bead (8) arranged in the
longitudinal direction of the marginal strip (3) -
30 particularly in the cross-sectional centre thereof - runs
uninterrupted and particularly with uniform cross section
throughout the length of the marginal strip (3).
- 35 7. A lining board as claimed in any one of claims 1 to 6,
characterized in that holes (12) traversing the marginal



strips (3), e.g. for attaching fastening bolts or the like, are provided in the area of the bead (8).

5 8. A lining board as claimed in claim 7, characterized in that the holes (12) provided in the marginal strips (3), particularly in the area of the beads (8), have a circular cross section and the diameter thereof in particular approximates the greatest width of the bead (8), and that in an arrangement in the area of the beads
10 (8) the walls of the holes also traverse the lateral boundaries (8b) of the bead (8).

15 9. A lining board as claimed in any one of claims 1 to 8, characterized in that the transitions from the longitudinal edges (6, 7) to the central area (5) of the marginal strip (3) and/or the lateral boundaries (8b) of the bead (8) run at a slant relative to the cross-sectional contour of the marginal strip (3), for example at an
20 angle of about 45 degrees.

