

CLAIMS

1. An anchorage part (30) for an impermeable wall structure, the anchorage part comprising:

an attachment unit (32, 33) which can be attached to an outer surface of an impermeable metal plate (1) comprising corrugations which project from the side of an inner surface (2) of the plate opposite the outer surface, the attachment unit (32, 33) being able to be attached to the plate at the level of an intersection (3) between a first corrugation belonging to a series of first parallel corrugations (5) and a second corrugation belonging to a series of second parallel corrugations (6); and

a retention unit (44) which can co-operate with a longitudinal end of an elongate reinforcement part (15, 115) in order to retain the reinforcement part in one of the corrugations (6, 5) which intersect at the level of said intersection, the reinforcement part being designed to be arranged in the corrugation, in order to increase resistance to pressure of the plate.

2. A ready-to-mount assembly which is suitable for producing an impermeable wall structure, the assembly comprising:

an anchorage part (30) according to claim 1;

the impermeable metal plate (1) having the series of first parallel corrugations (5) and the series of second parallel corrugations (6), the first corrugations intersecting with the second corrugations at the level of intersections (3), the corrugations projecting from the side of the inner surface (2) of the plate; and

the elongate reinforcement part (15, 115) being able to be arranged in one of said corrugations (6, 5) on the outer surface of the plate opposite the inner surface, in order to increase resistance to pressure of the plate.

3. The assembly as claimed in claim 2, wherein the anchorage part comprises a plurality of retention units (44) which can co-operate with respective ends of a plurality of reinforcement parts, in order to retain the reinforcement parts in a plurality of segments of the said corrugations of the impermeable metal plate, wherein the segments of the corrugations meet at the intersection (3) where the anchorage part is attached.

4. The assembly as claimed in claim 2 or 3, wherein the retention unit (44) can co-operate with the end of the reinforcement part (15, 115) in a support state in which the retention unit stops the end of the reinforcement part in a direction perpendicular to the

plate.

5. The assembly as claimed in one of claims 2 to 4, wherein the retention unit can co-operate with the end of the reinforcement part in a securing state in which the retention unit secures the reinforcement part (15, 115) on the anchorage part (30), such that the reinforcement part is retained on the plate solely by the effect of the anchorage part.

6. The assembly as claimed in one of claims 2 to 5, wherein the anchorage part comprises an arm (40) which is connected to the attachment unit, and wherein the retention unit (44) of the anchorage part is placed at the end of the arm (40), the arm being placed such as to extend in the corrugation (6) in which the reinforcement part (15) must be retained by the retention unit, in the attached state of the anchorage part (30).

7. The assembly as claimed in claim 6, wherein the arm comprises a positioning unit (41) with a contour which is designed for a transverse profile of a corrugation of the plate, the positioning unit being able to co-operate with the plate at the level of the lateral walls of the corrugation (6), in order to position the arm in the corrugation, in the attached state of the anchorage part (30).

8. The assembly as claimed in one of claims 2 to 7, wherein the retention unit comprises a lug (44, 48) which can extend longitudinally in a corrugation of the plate, in the attached state of the anchorage part, the reinforcement part comprising a receptacle (18) which is open at the level of a longitudinal end surface of the reinforcement part, and can receive the lug of the retention unit.

9. The assembly as claimed in claim 8, wherein the lug of the retention unit comprises a thickened portion (46), which can co-operate with the longitudinal end surface (49) of the reinforcement part, in order to stop the reinforcement part (15) longitudinally relative to the lug (44).

10. The assembly as claimed in claim 9, wherein the thickened portion (46) of the lug can be forced into the receptacle (18) of the reinforcement part, in order to secure the reinforcement part (15) firmly on the anchorage part (30), by resilient deformation of the thickened portion and/or of the receptacle of the reinforcement part.

11. The assembly as claimed in claim 10, wherein the anchorage part comprises a

stop unit (43) which can co-operate with the longitudinal end surface (49) of the reinforcement part, in order to limit the engagement of the lug (44) in the receptacle, beyond the thickened portion (46).

12. The assembly as claimed in one of claims 8 to 11, wherein the receptacle of the reinforcement part comprises a longitudinal groove (18) hollowed in an outer surface (17) of the reinforcement part which is designed to face opposite the plate.

13. The assembly as claimed in one of claims 2 to 12, wherein the attachment unit comprises a head (33) which can be attached to the outer surface of the plate (1) by resilient clearance of an undercut (4) of the plate, at the level of the intersection (3) of the corrugations.

14. The assembly as claimed in claim 13, wherein the anchorage part comprises a body (31) to which there is connected the or each retention unit (44) and a rod (32) which connects the head to the body whilst providing an empty space (39) between them.

15. The assembly as claimed in claim 14, wherein the rod (32) has a beveled form which narrows from the body (31) towards the head (33) of the anchorage part.

16. The assembly as claimed in one of claims 2 to 15, wherein said anchorage part is a first anchorage part comprising an attachment unit (32, 33) able to be attached to the plate at a first intersection between said corrugation in which the reinforcement part must be retained and a first other corrugation of the impermeable metal plate, wherein said corrugation in which the reinforcement part (15) must be retained further intersects a second other corrugation of the impermeable metal plate at a second intersection, and wherein the assembly additionally comprises a second anchorage part (130) comprising an attachment unit (32, 33) which can be attached to the outer surface of the plate at the second intersection (3) of the corrugation in which the reinforcement part (15) must be retained, and a retention unit (44) which can co-operate with a second longitudinal end of the reinforcement part, in order to retain the reinforcement part in the corrugation, the reinforcement part having a length which is designed for the distance between the retention units (44) of the two anchorage parts (30, 130) in the state of attachment to the plate, such that the reinforcement part is retained on the plate, between the two anchorage parts, by co-operation with the two retention units.

17. The assembly as claimed in one of claims 2 to 16, wherein the reinforcement part (15, 115) is constituted by a profiled body with a constant cross section.

18. A process for production of an impermeable wall structure comprising:

supplying an impermeable metal plate (1) with a series of first parallel corrugations (5) and a series of second parallel corrugations (6), the first corrugations intersecting with the second corrugations at the level of intersections (3), the corrugations projecting from the side of an inner surface of the plate;

arranging an anchorage part (30) comprising an attachment unit (32, 33) and a retention unit (44), such as to attach the attachment unit to an outer surface of the plate opposite the inner surface at the level of one of the intersections;

arranging an elongate reinforcement part (15) in a segment of one of the corrugations of the impermeable metal plate which meet at the intersection where the anchorage part is attached on the outer surface of the plate, such as to make a longitudinal end of the reinforcement part co-operate with the retention unit (44).

19. The process as claimed in claim 18, wherein said anchorage part is a first anchorage part attached to the impermeable plate at a first intersection between the corrugation in which the reinforcement part is arranged and a first other corrugation of the impermeable plate and wherein the process additionally comprises:

arranging a second anchorage part (130) comprising an attachment unit and a retention unit, such as to attach the attachment unit to the outer surface of the plate at a second intersection (3) between the corrugation in which the reinforcement part is arranged and a second other corrugation of the impermeable metal plate in the vicinity of the first intersection where the first anchorage part (30) is attached;

wherein the reinforcement part is arranged in the corrugation segment (14) which extends between the two intersections and is retained on the plate (1), between the two anchorage parts, by co-operation of the two longitudinal ends of the reinforcement part (15) with the two retention units (44).

20. The process as claimed in claim 18, additionally comprising:

securing the end of the reinforcement part (15) on the retention unit (44), such that the reinforcement part is retained on the plate solely by the effect of the anchorage part (30).

21. The process as claimed in claim 20, wherein the reinforcement part (15) is arranged in a corrugation segment (51) which extends between the intersection (3) where

the anchorage part is attached, and an edge of the plate (52), and extends from the edge of the plate in order to be able to be engaged in a corrugation of an adjacent plate (55).

22. The process as claimed in claim 18, additionally comprising:

attaching anchorage parts (30) comprising in each case an attachment unit and four units for retention on the outer surface of the plate, at the level of all the intersections (3) of the plate (1); and

arranging reinforcement parts (15, 115) in all the corrugation segments which extend in each case between two intersections, by making in each case two longitudinal ends of the reinforcement part co-operate with two retention units (44) of the two anchorage parts which are attached at the level of the two intersections (3), such as to retain the reinforcement parts on the plate.

23. The process as claimed in claim 22, additionally comprising:

arranging reinforcement parts (15, 115) in all the corrugation segments which extend between an edge of the plate (52) and intersections adjacent (3) to said edge of the plate; and

securing in each case the end of the reinforcement part on a retention unit (44) of the anchorage part attached at the level of the corresponding intersection, such that the reinforcement part is retained on the plate solely by the effect of the anchorage part extending from the edge of the plate (52).

24. An impermeable insulating vessel (71) arranged in a support structure, the vessel comprising a thermal insulation barrier and an impermeable barrier which is designed to be in contact with a product contained in the vessel, the impermeable barrier comprising a ready-to-mount assembly as claimed in one of claims 2 to 17, in a mounted state.

25. A ship (70) for the transport of a cold liquid product, the ship comprising a double hull (72) and a vessel (71) as claimed in claim 24, arranged in the double hull.

26. The use of a ship (70) as claimed in claim 25 for loading or unloading of a cold liquid product, wherein a cold liquid product is conveyed through insulated piping (73, 79, 76, 81) from or to a floating or land storage installation (77), to or from the vessel of the ship (71).

27. A transfer system for a cold liquid product, the system comprising a ship (70) as

claimed in claim 25, insulated piping which is placed such as to connect the vessel (71) installed in the hull of the ship to a floating or land storage installation (77), and a pump to convey a flow of cold liquid product through the insulated piping from or to the floating or land storage installation, to or from the vessel of the ship.

CLAIMS

1. An anchorage part (30) for an impermeable wall structure, the anchorage part comprising:
 - 5 an attachment unit (32, 33) which can be attached to the outer surface of an impermeable metal plate (1) comprising corrugations which project from the side of the inner surface (2) of the plate opposite the outer surface, the attachment unit
 - 10 (32, 33) being able to be attached to the plate at the level of an intersection (3) between a first corrugation belonging to a series of first parallel corrugations (5) and a second corrugation belonging to a series of second parallel
 - 15 corrugations (6); and
 - a retention unit (44) which can co-operate with a longitudinal end of an elongate reinforcement part (15, 115) in order to retain the reinforcement part in one of the corrugations (6, 5) which
 - 20 intersect at the level of said intersection, the reinforcement part being designed to be arranged in the corrugation, in order to increase resistance to pressure of the plate.
- 25 2. A ready-to-mount assembly which is suitable for producing an impermeable wall structure, the assembly comprising:
 - an anchorage part (30) according to claim 1;
 - the impermeable metal plate (1) having the series
 - 30 of first parallel corrugations (5) and the series of second parallel corrugations (6), the first corrugations intersecting with the second corrugations at the level of intersections (3), the corrugations projecting from the side of the
 - 35 inner surface (2) of the plate; and
 - the elongate reinforcement part (15, 115) being able to be arranged in one of said corrugations (6, 5) on the outer surface of the plate opposite

the inner surface, in order to increase resistance to pressure of the plate.

3. The assembly as claimed in claim 2, wherein the
5 anchorage part comprises a plurality of retention
units (44) which can co-operate with respective
ends of a plurality of reinforcement parts, in
order to retain the reinforcement parts in a
10 plurality of corrugation segments which are at the
level of the intersection (3) where the anchorage
part is attached.
4. The assembly as claimed in claim 2 or 3, wherein
15 the retention unit (44) can co-operate with the
end of the reinforcement part (15, 115) in a
support state in which the retention unit stops
the end of the reinforcement part in a direction
perpendicular to the plate.
- 20 5. The assembly as claimed in one of claims 2 to 4,
wherein the retention unit can co-operate with the
end of the reinforcement part in a securing state
in which the retention unit secures the
25 reinforcement part (15, 115) on the anchorage part
(30), such that the reinforcement part is retained
on the plate solely by the effect of the anchorage
part.
- 30 6. The assembly as claimed in one of claims 2 to 5,
wherein the retention unit (44) of the anchorage
part is placed at the end of an arm (40) which is
connected to the attachment unit, the arm being
placed such as to extend in the corrugation (6) in
35 which the reinforcement part (15) must be retained
by the retention unit, in the attached state of
the anchorage part (30).

7. The assembly as claimed in claim 6, wherein the arm comprises a positioning unit (41) with a contour which is designed for a transverse profile of a corrugation of the plate, the positioning unit being able to co-operate with the plate at the level of the lateral walls of the corrugation (6), in order to position the arm in the corrugation, in the attached state of the anchorage part (30).
8. The assembly as claimed in one of claims 2 to 7, wherein the retention unit comprises a lug (44, 48) which can extend longitudinally in a corrugation of the plate, in the attached state of the anchorage part, the reinforcement part comprising a receptacle (18) which is open at the level of a longitudinal end surface of the reinforcement part, and can receive the lug of the retention unit.
9. The assembly as claimed in claim 8, wherein the lug of the retention unit comprises a thickened portion (46), which can co-operate with the longitudinal end surface (49) of the reinforcement part, in order to stop the reinforcement part (15) longitudinally relative to the lug (44).
10. The assembly as claimed in claim 9, wherein the thickened portion (46) of the lug can be forced into the receptacle (18) of the reinforcement part, in order to secure the reinforcement part (15) firmly on the anchorage part (30), by resilient deformation of the thickened portion and/or of the receptacle of the reinforcement part.
11. The assembly as claimed in claim 10, wherein the anchorage part comprises a stop unit (43) which

can co-operate with the longitudinal end surface (49) of the reinforcement part, in order to limit the engagement of the lug (44) in the receptacle, beyond the thickened portion (46).

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12. The assembly as claimed in one of claims 8 to 11, wherein the receptacle of the reinforcement part comprises a longitudinal groove (18) hollowed in an outer surface (17) of the reinforcement part
- 10 which is designed to face opposite the plate.
13. The assembly as claimed in one of claims 2 to 12, wherein the attachment unit comprises a head (33) which can be attached to the outer surface of the
- 15 plate (1) by resilient clearance of an undercut (4) of the plate, at the level of the intersection (3) of the corrugations.
14. The assembly as claimed in claim 13, wherein the
- 20 anchorage part comprises a body (31) to which there is connected the or each retention unit (44) and a rod (32) which connects the head to the body whilst providing an empty space (39) between them.
- 25 15. The assembly as claimed in claim 14, wherein the rod (32) has a beveled form which narrows from the body (31) towards the head (33) of the anchorage part.
- 30 16. The assembly as claimed in one of claims 2 to 15, wherein the assembly additionally comprises a second anchorage part (130) comprising an attachment unit (32, 33) which can be attached to the outer surface of the plate at the level of a
- 35 second intersection (3) of the corrugation in which the reinforcement part (15) must be retained, and a retention unit (44) which can co-operate with a second longitudinal end of the

reinforcement part, in order to retain the reinforcement part in the corrugation, the reinforcement part having a length which is designed for the distance between the retention units (44) of the two anchorage parts (30, 130) in the state of attachment to the plate, such that the reinforcement part is retained on the plate, between the two anchorage parts, by co-operation with the two retention units.

17. The assembly as claimed in one of claims 2 to 16, wherein the reinforcement part (15, 115) is constituted by a profiled body with a constant cross section.

18. A process for production of an impermeable wall structure comprising:
supplying an impermeable metal plate (1) with a series of first parallel corrugations (5) and a series of second parallel corrugations (6), the first corrugations intersecting with the second corrugations at the level of intersections (3), the corrugations projecting from the side of an inner surface of the plate;
arranging an anchorage part (30) comprising an attachment unit (32, 33) and a retention unit (44), such as to attach the attachment unit to the outer surface of the plate opposite the inner surface at the level of one of the intersections;
arranging an elongate reinforcement part (15) in a corrugation segment adjacent to the intersection on the outer surface of the plate, such as to make a longitudinal end of the reinforcement part co-operate with the retention unit (44).

19. The process as claimed in claim 18, additionally comprising:

arranging a second anchorage part (130) comprising an attachment unit and a retention unit, such as to attach the attachment unit to the outer surface of the plate at the level of a second intersection (3) in the vicinity of the first intersection where the first anchorage part (30) is attached; wherein the reinforcement part is arranged in the corrugation segment (14) which extends between the two intersections and is retained on the plate (1), between the two anchorage parts, by cooperation of the two longitudinal ends of the reinforcement part (15) with the two retention units (44).

20. The process as claimed in claim 18, additionally comprising:
securing the end of the reinforcement part (15) on the retention unit (44), such that the reinforcement part is retained on the plate solely by the effect of the anchorage part (30).

21. The process as claimed in claim 20, wherein the reinforcement part (15) is arranged in a corrugation segment (51) which extends between the intersection (3) where the anchorage part is attached and an edge of the plate (52), and extends from the edge of the plate in order to be able to be engaged in a corrugation of an adjacent plate (55).

22. The process as claimed in claim 18, additionally comprising:
attaching anchorage parts (30) comprising in each case an attachment unit and four units for retention on the outer surface of the plate, at the level of all the intersections (3) of the plate (1); and

arranging reinforcement parts (15, 115) in all the corrugation segments which extend in each case between two intersections, by making in each case two longitudinal ends of the reinforcement part co-operate with two retention units (44) of the two anchorage parts which are attached at the level of the two intersections (3), such as to retain the reinforcement parts on the plate.

23. The process as claimed in claim 22, additionally comprising:

arranging reinforcement parts (15, 115) in all the corrugation segments which extend between an edge of the plate (52) and intersections adjacent (3) to said edge of the plate; and

securing in each case the end of the reinforcement part on a retention unit (44) of the anchorage part attached at the level of the corresponding intersection, such that the reinforcement part is retained on the plate solely by the effect of the anchorage part extending from the edge of the plate (52).

24. An impermeable insulating vessel (71) arranged in a support structure, the vessel comprising a thermal insulation barrier and an impermeable barrier which is designed to be in contact with a product contained in the vessel, the impermeable barrier comprising a ready-to-mount assembly as claimed in one of claims 2 to 17, in a mounted state.

25. A ship (70) for the transport of a cold liquid product, the ship comprising a double hull (72) and a vessel (71) as claimed in claim 24, arranged in the double hull.

26. The use of a ship (70) as claimed in claim 25 for loading or unloading of a cold liquid product, wherein a cold liquid product is conveyed through insulated piping (73, 79, 76, 81) from or to a floating or land storage installation (77), to or from the vessel of the ship (71).
27. A transfer system for a cold liquid product, the system comprising a ship (70) as claimed in claim 25, insulated piping (73, 79, 76, 81) which is placed such as to connect the vessel (71) installed in the hull of the ship to a floating or land storage installation (77), and a pump to convey a flow of cold liquid product through the insulated piping from or to the floating or land storage installation, to or from the vessel of the ship.