CLAIMS

1. A leakproof and thermally insulating tank incorporated in a supporting structure, said tank comprising a tank wall borne by a supporting wall of the supporting structure, the tank wall comprising:

- a thermally insulating barrier (30, 32) fixed onto the supporting wall and defining a support surface (1, 21) parallel to the supporting wall, the thermally insulating barrier (30, 32) comprising a plurality of juxtaposed parallelepipedal insulating elements (12), the support surface (1, 21) being formed by a top surface of the plurality of insulating elements (12),

- a metal leakproof membrane borne by the support surface (1, 21), the metal leakproof membrane comprising a plurality of metal strakes (4, 9), each metal strake (4, 9) being a profiled part extending in a longitudinal direction and whose transverse section comprises a base comprising a planar median portion (10, 14) resting on the support surface (1, 21) and two raised lateral edges (11, 15) protruding from the base in a direction of thickness of the tank wall, the raised edges (11, 15) being formed from the opposite longitudinal edges of the planar median portion (10, 14) of the base, the metal strakes (4, 9) being arranged parallel to one another on the support surface (1, 21),

in which the thermally insulating barrier has a recess hollowed out in the thickness of the insulating elements (12), a bottom of the recess forming a portion (21) of the support surface (1, 21), the recess extending in the longitudinal direction and having an emerging opening and a retaining zone (20) extending in a lateral direction at right angles or obliquely to a direction of thickness of the insulating elements,

at least one of the metal strakes constituting an anchoring strake (4) of which the planar median portion (14) rests on the bottom of the recess, said anchoring strake (4) comprising an anchoring flange (22) protruding laterally from a longitudinal edge of the planar median portion (14) and extending in the retaining zone (20) of the recess of the thermally insulating barrier so as to retain the anchoring strake (4) on the support surface (21) in the direction of thickness, each raised lateral

edge (15) of the anchoring strake (4) being tightly welded to a raised lateral edge (11) of a respective adjacent metal strake (9).

2. The leakproof and thermally insulating tank as claimed in claim 1, in which the insulating elements (12) comprise cover panels (13), the support surface (1, 21) being formed by the cover panels (13) of the insulating elements (12), the recess being formed in the thickness of at least one of said cover panels (13).

3. The leakproof and thermally insulating tank as claimed in claim 2, in which the top surface of at least one of said cover panels (13) forming the support surface (1) has a trough zone (35) extending in the longitudinal direction, wherein the recess formed in the thickness of at least one of said cover panels comprises said trough zone (35), the anchoring strake (4) being arranged in the trough zone (35) such that the planar median portion (14) of the anchoring strake (4) rests on a bottom (21) of the trough zone (35).

4. The leakproof and thermally insulating tank as claimed in claim 3, in which the trough zone (35) comprises a lateral wall (36) linking the top face of said at least one of said cover panels (13) and the bottom (21) of the trough zone (35), the recess comprising a groove (20) emerging on the lateral wall (36) of the trough zone (35), the groove (20) extending in a lateral direction at right angles or obliquely to the direction of thickness of the insulating elements.

5. The leakproof and thermally insulating tank as claimed in claim 4, in which the top face of said at least one of said cover panels (13) comprises a trench (16), the groove (20) being formed jointly by the trench (16) and by an added part (19) housed in the trench (16), said added part (19) forming the lateral wall (36) of the trough zone (35) and a portion of the top surface (1) of said at least one of said cover panels (13) situated level with the groove (20), a bottom (17) of the trench (16) forming the bottom (21) of the trough zone (35).

6. The leakproof and thermally insulating tank as claimed in one of claims 1 to 5, in which the anchoring flange (22) of the anchoring strake (4) constitutes a first anchoring flange protruding laterally from a first longitudinal edge of the planar median portion (14) and the recess constituting a first recess, a second recess being hollowed out in the thickness of the insulating elements (12) from the support surface (1, 21), the second recess extending in the longitudinal direction and having a second

emerging opening and a second retaining zone extending in a lateral direction at right angles or obliquely to the direction of thickness, the anchoring strake (4) comprising a second anchoring flange protruding laterally from a second longitudinal edge of the planar median portion (14) of the anchoring strake (4) and extending in the second recess of the thermally insulating barrier so as to retain the anchoring strake on the support surface (1) in the direction of thickness.

7. The leakproof and thermally insulating tank as claimed in claim 6 in combination with claim 4,

in which the lateral wall of the trough zone constitutes a first lateral wall of the trough zone, the trough zone comprising a second lateral wall linking the top face of said at least one of said cover panels and the bottom of the trough zone, the second recess emerging on the second lateral wall of the trough zone.

8. The leakproof and thermally insulating tank as claimed in one of claims 1 to 7, in which the anchoring strake comprises a part (24) of "U"-shaped cross section whose branches form the raised edges (15) of the anchoring strake (4) and whose base forms the planar median portion (14), said base being welded onto a planar plate (25) forming said anchoring flange (22), the planar plate (25) having a width taken in a widthwise direction at right angles to the longitudinal direction wider than the base of the part (24) of "U"-shaped section in this widthwise direction.

9. The leakproof and thermally insulating tank as claimed in one of claims 6 and 7, in which the first anchoring flange and the second anchoring flange are symmetrical on a plane that is formed parallel to the longitudinal direction and at right angles to the support surface (1).

10. The leakproof and thermally insulating tank as claimed in one of claims 1 to 9, in which the metal strakes (9) are composed of a material chosen from the group consisting of nickel steel alloys and manganese steel alloys exhibiting a thermal contraction coefficient less than $1.6.10^{-5}$ /K.

11. A ship (70) for transporting a cold liquid product, the ship comprising a double hull (72) and the leakproof and thermally insulating tank (71) as claimed in one of claims 1 to 10 arranged in the double hull.

12. The ship as claimed in claim 11, in which the longitudinal direction of the metal strakes is at right angles to a longitudinal axis of the ship.

13. The ship as claimed in claim 12, in which the end of the metal strakes (9) whose longitudinal direction is at right angles to a longitudinal axis of the ship is welded onto an angle bracket of the leakproof and thermally insulating tank, said angle bracket defining a corner of the tank extending at right angles to the longitudinal direction of the metal strakes (9), the angle bracket being formed by a plurality of metal parts (35) juxtaposed along the corner of the tank with mutual spacings, the metal parts being joined to one another by curved parts (38).

14. The ship as claimed in claim 13, in which the curved parts (38) are offset along the longitudinal axis of the ship relative to the raised edges (11) of the metal strakes.

15. The ship as claimed in claim 11, in which the longitudinal direction of the metal strakes is parallel to a longitudinal axis of the ship.

16. The ship as claimed in one of claims 11 to 15, in which the leakproof membrane further comprises at least two transverse strakes (42, 45, 48, 52, 53), one said transverse strake (42, 45, 48, 52, 53) being a profiled part extending in a direction at right angles to the longitudinal direction of the metal strakes and comprising a planar portion (43, 46, 49) and at least one raised lateral edge (44, 47, 50), the tank wall further comprising at least one transverse support (51) anchored in the thermally insulating barrier, the transverse support (51) extending in a direction at right angles to the longitudinal direction, said at least one raised edge (44, 47, 50) of said transverse strakes (42, 45, 48, 52, 53) being tightly welded to the transverse support (51) on each longitudinal side of said transverse support (51), a longitudinal end of the metal strakes (9) being tightly welded to the planar portion (43, 46, 49) of one of the transverse strakes (42, 45, 48, 52, 53).

17. The ship as claimed in claim 16, in which the transverse support is formed by an transverse anchoring strake having a planar median portion and two raised edges arranged along the longitudinal edges of said planar median portion, a transverse anchoring flange being attached to said transverse planar median portion and anchored in the thermally insulating barrier, each raised lateral edge of said

transverse anchoring strake being tightly welded to a raised lateral edge of a respective adjacent transverse strake.

18. The ship as claimed in claim 16 or 17, in which the transverse strakes (53, 54) are arranged in a central portion of a planar wall of the tank and the leakproof membrane comprises at least two metal strakes (9) situated along the longitudinal direction on each side of the transverse strakes (53, 54), said at least two metal strakes (9) being tightly welded onto a respective transverse strake.

19. The ship as claimed in claim 16 or 17, in which the transverse strakes (42, 45, 48) are arranged at the edge of a planar wall of the tank, at the junction between the longitudinal ends of metal strakes (9) and of a corner structure (39), at least two transverse strakes (42, 45, 48) being arranged between the metal strakes (9) and the corner structure (39) of the tank, the planar portion (43) of one of the at least two transverse strakes being tightly welded to the corner structure (39) and the longitudinal ends of said metal strakes (9) being welded to the planar portion (45) of the other of at least two transverse strakes.

20. Method for loading or offloading a ship (70), comprising:

- providing a ship according to one of claims 11 to 19; and

- conveying a cold liquid product through insulated pipelines (73, 79, 76, 81) from or to a floating or onshore storage installation (77) to or from the leakproof and thermally insulating tank.

21. A transfer system for a cold liquid product, the system comprising the ship (70) as claimed in one of claims 11 to 19, insulated pipelines (73, 79, 76, 81) arranged so as to link the tank (71) installed in the hull of the ship to a floating or onshore storage installation (77) and a pump for driving a flow of cold liquid product through the insulated pipelines from or to the floating or onshore storage installation to or from the tank of the ship.