

CLAIMS

1. A sealed and thermally insulated vessel for storing a fluid, comprising a secondary thermal insulation barrier (1) comprising insulation panels (2) held against a load-bearing structure (3) and anchored to the load-bearing structure by secondary retaining members (8), a secondary sealing membrane (4) carried by the insulation panels (2) of the secondary thermal insulation barrier (1), a primary thermal insulation barrier (5) anchored against the secondary sealing membrane (4) by primary retaining members (19) and a primary sealing membrane (7) carried by the primary thermal insulation barrier (6) and designed to be in contact with the cryogenic fluid contained in the vessel,

the secondary sealing membrane (4) comprising a plurality of metal sheets (24) sealingly welded to one another,

the insulation panels (2) of the secondary thermal insulation barrier (1) being juxtaposed, each insulation panel (2) having an inner face opposite the load-bearing wall, said inner face being fitted with metal plates (17, 18) onto which the metal sheets (24) are welded,

each insulation panel (2) being associated with adjacent insulation panels (2) by means of a plurality of bridging elements (22, 43, 44, 48), each bridging element (22, 43, 44, 48) being arranged to straddle at least two adjacent insulating panels (2) and being attached firstly to one edge of the inner face (10) of one of the two insulation panels (2) and secondly to an edge of the inner face (10) of the other insulation panel (2) such as to prevent the adjacent insulation panels (2) from moving apart from one another, said edges of the inner faces (10) of each of the adjacent insulating panels facing one another.
2. The vessel as claimed in claim 1, in which each of the metal sheets (24) has at least two perpendicular corrugations (25, 26, 53), the corrugations (25, 26) of the metal sheets (24) of the secondary sealing membrane (4) project towards the outside of the vessel and towards the load-bearing structure (3), the inner face (10) of the insulation panels (2) of the secondary thermal insulation barrier (1) having slots (14, 15) which are perpendicular to each other and designed to receive the corrugations (25, 26) of the metal sheets (24).

3. The vessel as claimed in claim 1, in which each of the metal sheets (24) has at least two perpendicular corrugations (25, 26, 53), the corrugations (53) of the metal sheets (24) of the secondary sealing membrane (4) project towards the inside of the vessel, the primary thermal insulation barrier (5) having insulation panels (6), each of which has an outer face (31) with perpendicular slots (54) designed to receive the corrugations (53) of the metal sheets (24) of the secondary sealing membrane (4).
4. The vessel as claimed in any one of claims 1 to 3, in which the bridging elements are bridging plates (22) that each have an outer face bearing against the inner face (10) of each of the adjacent insulation panels (1) and an inner face carrying the secondary sealing membrane (4).
5. The vessel as claimed in claim 4, in which the inner face (10) of the insulation panels (2) has recesses (21) formed along the edges of said inner face (10), and the bridging plates (22) are attached to the inside of said recesses.
6. The vessel as claimed in claim 4 or 5, in which the bridging plates (22) are attached by bonding, screwing and/or stapling against the inner face (10) of each of the two adjacent insulation panels (1).
7. The vessel as claimed in any one of claims 4 to 6, in which the bridging plates (22) are made of plywood.
8. The vessel as claimed in claim 2, in which each insulation panel (2) has a rectangular parallelepiped shape and has an inner face (10) including two series of slots (14, 15) designed to receive the corrugations (25, 26) of the metal sheets (24), each of the two series of slots (14, 15) being perpendicular to the other series and to two opposite sides of the insulation panel (2), the plurality of bridging elements (22, 43, 44, 48) including, along each edge of the inner surface of each insulation panel (2), a bridging element (22, 43, 44, 48) arranged in each gap between two consecutive slots (14, 15) in the series of slots perpendicular to said edge.
9. The vessel as claimed in claim 2, in which each insulation panel (2) has a rectangular parallelepiped shape and has an inner face (10) including two series of slots (14, 15) designed to receive the corrugations (25, 26) of the metal sheets (24), each of the two series of slots (14, 15) being perpendicular to the other

series and to two opposite sides of the insulation panel (2), the plurality of bridging elements (22) including, along each edge of the inner surface of each insulation panel (2), a bridging element (22) having a series of slots extending the series of slots perpendicular to said edge.

- 5 10. The vessel as claimed in claim 9, in which the bridging element (22) comprising a series of slots extending the series of slots (14, 15) perpendicular to said edge also includes a slot (50) perpendicular to said series of slots.
11. The vessel as claimed in any one of claims 1 to 3, in which a bridging element includes an elongate element (48) that is rigidly attached to two attachment
10 members (49) attached respectively to each of the two adjacent insulation panels (2).
12. The vessel as claimed in any one of claims 1 to 3, in which a bridging element is formed by two metal plates (43, 44) each having a folded edge forming a flange (46), the flanges (46) being respectively held inside a slot (45) formed in the inner
15 face (10) of each of the two adjacent insulation panels (2), the two metal plates (43, 44) being attached together by attachment members (47).
13. The vessel as claimed in any one of claims 1 to 3, in which each insulation panel (2) has a layer of insulating polymer foam (9) and a rigid inner plate (10) forming the inner face of said insulation panel (2).
- 20 14. The vessel as claimed in any one of claims 1 to 3, in which the insulation panels (2) are separated from one another by interstices (12), the secondary thermal insulation barrier (1) having an insulating blanket (13) arranged in the interstices (12).
15. The vessel as claimed in claim 14, in which the insulating blanket (13) arranged
25 in the interstices (12) between the insulation panels (2) is a porous blanket formed to allow gas to flow through the interstices (12).
16. The vessel as claimed in any one of claims 1 to 3, in which the primary sealing membrane (7) has a plurality of metal sheets (39) welded to one another, and in which the primary thermal insulation barrier (5) has a plurality of juxtaposed
30 insulation panels (6), each insulation panel (6) having an inner face (30) fitted with metal plates (32, 33)

onto which the metal sheets (39) of the primary sealing membrane (7) are welded.

17. A ship (70) used to transport a fluid, the ship having a double hull (72) and a vessel (71) as claimed in any one of claims 1 to 3, placed inside the double hull.

5 18. A method for loading or offloading a ship (70) as claimed in claim 17, in which a fluid is channeled through insulated pipes (73, 79, 76, 81) to or from an onshore or floating storage facility (77) to or from the vessel on the ship (71).

10 19. A transfer system for a fluid, the system including a ship (70) as claimed in claim 17, insulated pipes (73, 79, 76, 81) arranged to connect the vessel (71) installed in the hull of the ship to an onshore or floating storage facility (77) and a pump for driving a fluid through the insulated pipes to or from the onshore or floating storage facility to or from the vessel on the ship.