

[DESCRIPTION]

[Invention Title]

LIQUEFIED GAS STORAGE TANK

[Technical Field]

5 [1] The present disclosure relates to a liquefied gas storage tank.

[Background Art]

[2] In general, a liquefied gas storage tank for onshore use is used to store various liquefied gases, including liquefied gases for fuel, such as liquefied natural gas (LNG) and liquefied petroleum gas (LPG), as well as liquefied oxygen, liquefied nitrogen, and the like.

10 [3] The external shape of a conventional liquefied gas storage tank for onshore use is formed by pouring concrete on a foundation to form a cylindrical tank body having a substantially dome-shaped cover.

[4] According to the conventional liquefied gas storage tank for onshore use, a vapor barrier is installed inside the tank body made of concrete (that is, an outer tank), and an inner
15 tank configured to directly accommodate a liquefied gas is installed inside the vapor barrier.

[5] Since the inner tank is a portion directly contacting the liquefied gas in a cryogenic state, the inner tank may be made of a material capable of withstanding cryogenic temperatures, such as cryogenic steel, and the vapor barrier may be made of a material such as general carbon steel.

20 [6] The inner tank may comprise a thermal insulation wall formed by installing a plurality of thermal insulation panels on an inner surface and a bottom of the outer tank, and a barrier formed by installing a plurality of corrugated membrane sheets on the thermal insulation wall.

Such an inner tank may comprise a vertical portion and a bottom portion.

[7] However, in manufacturing the inner tank, in the case of the vertical portion, there is no difficulty in installing a plurality of thermal insulation panels and a plurality of corrugated membrane sheets along an inner circumferential surface of the outer tank, but in the case of the bottom portion, since the bottom portion should be manufactured in a disk shape to be connected to a lower portion of the cylindrical vertical portion, regular thermal insulation panels and regular corrugated membrane sheets cannot be used in peripheral portions in contact with the vertical portion depending on the arrangement of the thermal insulation panels and the corrugated membrane sheets, thereby increasing manufacturing costs and making maintenance difficult.

[8] Meanwhile, a liquefied gas storage tank for onshore use may be provided with a side opening, which is a passage through which work materials and facilities are carried into or out of the inside and outside thereof and through which a worker may pass.

[9] In the conventional liquefied gas storage tank for onshore use, the side opening is spaced apart upward by a considerable distance from a corner structure where the vertical portion and the bottom portion of the inner tank are in contact with each other, and thus an additional installation of a vapor barrier is required between the corner structure and the side opening, thereby increasing the process and manufacturing costs, and the side opening becomes distant from a foundation or the bottom portion, resulting in difficulties in transporting materials and facilities and in movement of workers.

[10] In addition, the conventional liquefied gas storage tank for onshore use has a problem in that the side opening is formed on a single surface of a wall forming an accommodation space, thereby limiting the size of the side opening.

[Disclosure]

[Technical Problem]

[11] As described above, the present disclosure has been made to solve the problems of the related art, and an object of the present disclosure is to provide a liquefied gas storage tank capable of easily manufacturing a liquefied gas storage tank for onshore use, reducing
5 manufacturing costs, and improving maintenance.

[Technical Solution]

[12] A liquefied gas storage tank according to one aspect of the present disclosure is a storage tank storing liquefied gas, the storage tank comprising: a barrier configured to be in contact with the liquefied gas and form a storage space accommodating the liquefied gas; and
10 a plurality of thermal insulation walls installed on a support structure and provided on an outer side of the barrier, wherein the liquefied gas storage tank comprises: a plurality of bonding strips provided along a first direction on an outer surface fixed to the support structure in each of the plurality of thermal insulation walls; and a plurality of sealing strips provided along a second direction different from the first direction.

15 [13] The plurality of sealing strips may comprise: first sealing strips provided along the second direction in each of the plurality of thermal insulation walls; and second sealing strips provided along the second direction between a pair of the thermal insulation walls disposed adjacent to each other among the plurality of thermal insulation walls.

[14] The plurality of sealing strips may block thermal convection generated through spaces
20 between the plurality of bonding strips and spaces between the plurality of thermal insulation walls.

[15] A liquefied gas storage tank according to one aspect of the present disclosure is a

storage tank storing liquefied gas, the storage tank comprising: a primary barrier configured to be in contact with the liquefied gas and form a storage space of the liquefied gas; and at least one thermal insulation wall installed on a support structure and provided on an outer side of the primary barrier, wherein the liquefied gas storage tank comprises: a secondary barrier
5 installed between the thermal insulation walls and provided from a bottom of the storage space to a predetermined height; and a lower barrier finishing part fixing the secondary barrier to the support structure, wherein the lower barrier finishing part comprises: an embedded plate embeddedly installed at the predetermined height from the bottom of the storage tank along an inner circumferential surface of the support structure; and a protruding plate protruding inward
10 from the embedded plate.

[16] Specifically, the liquefied gas storage tank may comprise: a step-buffering means configured to alleviate an inner and outer step difference between the protruding plate and the secondary barrier; and a sealing plate having a bent shape, contacting an outer surface of the step-buffering means, and sealingly connecting between the protruding plate and the secondary
15 barrier.

[17] Specifically, the step-buffering means may comprise: an upper horizontal plate; a vertical plate connected to the upper horizontal plate; and a lower horizontal plate connected to the vertical plate and parallel to the upper horizontal plate.

[18] Specifically, the sealing plate may be configured such that an upper portion extending
20 horizontally is bonded to an upper surface of the upper horizontal plate of the step-buffering means by an adhesive, and a lower portion extending vertically is bonded to the secondary barrier by the adhesive.

[19] Specifically, the lower barrier finishing part may comprise: a sealing plate having a bent shape and sealingly connecting between the protruding plate and the secondary barrier;

and a block member provided between a lower surface of the sealing plate and an upper end of the thermal insulation wall.

[20] Specifically, the sealing plate may be configured such that an upper portion extending horizontally is bonded to an upper surface of the protruding plate by an adhesive, and a lower
5 portion extending vertically is bonded to the secondary barrier by the adhesive.

[21] A liquefied gas storage tank according to one aspect of the present disclosure is a storage tank storing liquefied gas, the storage tank comprising: a primary barrier configured to be in contact with the liquefied gas and form a storage space of the liquefied gas; and a thermal insulation wall installed on a support structure and provided on an outer side of the primary
10 barrier, wherein the liquefied gas storage tank comprises an upper barrier finishing part fixing the primary barrier to the support structure, and the upper barrier finishing part comprises: an embedded plate embeddedly installed at an upper portion of the support structure along an inner circumferential surface of the support structure; a protruding plate protruding inward from the embedded plate; and a sealing plate having a bent shape and sealingly connecting
15 between the protruding plate and the primary barrier.

[22] Specifically, the upper barrier finishing part may further comprise a closing block provided between the thermal insulation wall and the protruding plate and between the thermal insulation wall and the sealing plate.

[23] Specifically, the upper barrier finishing part may further comprise a panel joint inserted
20 and installed in a tolerance section generated between the thermal insulation wall and the closing block.

[24] A liquefied gas storage tank according to one aspect of the present disclosure may comprise: a wall forming an accommodation space storing liquefied gas and having a polygonal planar cross-section; and a side opening formed in the wall, wherein the side opening may be

formed across a first surface of the wall and a first-1 surface bendably connected to the first surface.

[25] Specifically, the liquefied gas storage tank may comprise: a barrier provided inside the wall; and a temporary barrier provided at an end of the barrier facing the side opening.

5 [26] Specifically, a gap may be formed between the temporary barriers respectively provided on the first surface and the first-1 surface, and the liquefied gas storage tank may comprise a cover member covering at least a portion of the gap.

[Advantageous Effects]

[27] A liquefied gas storage tank according to an embodiment of the present disclosure may
10 improve structures such as thermal insulation walls and barriers at least in a bottom portion, thereby enabling easy manufacturing and achieving effects such as reduction of manufacturing costs and improvement of maintenance.

[Brief Description of Drawings]

[28] FIG. 1 is a view for explaining a liquefied gas storage tank according to a first
15 embodiment of the present disclosure.

[29] FIG. 2 is a cross-sectional view for explaining a bottom portion of the liquefied gas storage tank according to the first embodiment of the present disclosure.

[30] FIG. 3 is a cross-sectional view for explaining a vertical portion of the liquefied gas storage tank according to the first embodiment of the present disclosure.

20 [31] FIG. 4 is a partial plan view for explaining the bottom portion of the liquefied gas storage tank according to the first embodiment of the present disclosure.

[32] FIG. 5 is a partial plan view for explaining a plurality of unit elements provided in a

bottom portion in the liquefied gas storage tank according to the first embodiment of the present disclosure.

[33] FIG. 6 is a partial plan view for explaining a bottom portion of the liquefied gas storage tank according to the second embodiment of the present disclosure.

5 [34] FIG. 7 is a partial plan view for explaining thermal insulation walls and barriers provided in a bottom portion in the liquefied gas storage tank according to the second embodiment of the present disclosure.

[35] FIG. 8 is a view for explaining a vertical portion of the liquefied gas storage tank according to the third embodiment of the present disclosure.

10 [36] FIGS. 9 and 10 are views for explaining a vertical portion of the liquefied gas storage tank according to the fourth embodiment of the present disclosure.

[37] FIG. 11 is a view for explaining a thermal convection problem occurring in a vertical portion of a conventional liquefied gas storage tank.

[38] FIG. 12 is a cross-sectional view for explaining a vertical portion of the liquefied gas storage tank according to the fifth embodiment of the present disclosure.

15 [39] FIG. 13 is a partial cross-sectional view for explaining a manufacturing process of a connection thermal insulation material in the liquefied gas storage tank according to the fifth embodiment of the present disclosure.

[40] FIG. 14 is a view illustrating a cross section taken along line S2 in the vertical portion of the liquefied gas storage tank according to FIG. 12.

[41] FIG. 15 is a cross-sectional view for explaining a vertical portion of the liquefied gas storage tank according to the sixth embodiment of the present disclosure.

[42] FIG. 16 is a view illustrating a cross section taken along line S3 in the vertical portion

of the liquefied gas storage tank according to FIG. 15.

[43] FIG. 17 is a cross-sectional view for explaining a vertical portion of the liquefied gas storage tank according to the seventh embodiment of the present disclosure.

[44] FIG. 18 is a view illustrating a cross section taken along line S4 in the vertical portion
5 of the liquefied gas storage tank according to FIG. 17.

[45] FIG. 19 is a cross-sectional view for explaining a vertical portion of the liquefied gas storage tank according to the eighth embodiment of the present disclosure.

[46] FIG. 20 is an enlarged view illustrating a portion of a structure of the liquefied gas storage tank according to FIG. 19.

10 [47] FIG. 21 is a cross-sectional view for explaining a vertical portion of the liquefied gas storage tank according to the ninth embodiment of the present disclosure.

[48] FIG. 22 is a view for explaining the vertical portion of the liquefied gas storage tank according to FIG. 21.

[49] FIGS. 23 to 25 are cross-sectional views for explaining a manufacturing process of the
15 liquefied gas storage tank according to FIG. 21.

[50] FIG. 26 is a cross-sectional view for explaining a vertical portion of the liquefied gas storage tank according to the tenth embodiment of the present disclosure.

[51] FIG. 27 is a graph for explaining effects achieved by the liquefied gas storage tank according to FIG. 26.

20 [52] FIG. 28 is a cross-sectional view illustrating a vulnerable structure occurring in a vertical portion of a liquefied gas storage tank.

[53] FIG. 29 is a cross-sectional view for explaining a vertical portion of the liquefied gas storage tank according to the eleventh embodiment of the present disclosure.

- [54] FIG. 30 is a rear view of a thermal insulation wall for explaining a vertical portion of the liquefied gas storage tank according to the twelfth embodiment of the present disclosure.
- [55] FIGS. 31(a) and 31(b) are cross-sectional views for explaining a vertical portion of the liquefied gas storage tank according to the thirteenth embodiment of the present disclosure.
- 5 [56] FIG. 32 is a partial perspective view for explaining a lower barrier finishing part in the liquefied gas storage tank according to the fourteenth embodiment of the present disclosure.
- [57] FIG. 33 is an enlarged view of portion A of FIG. 32 for explaining the lower barrier finishing part in the liquefied gas storage tank according to the fourteenth embodiment of the present disclosure.
- 10 [58] FIGS. 34(a) to 34(c) are views for explaining an installation process of the lower barrier finishing part in the liquefied gas storage tank according to the fourteenth embodiment of the present disclosure.
- [59] FIG. 35 is a cross-sectional view for explaining a lower barrier finishing part in the liquefied gas storage tank according to the fifteenth embodiment of the present disclosure.
- 15 [60] FIG. 36 is a cross-sectional view for explaining an upper barrier finishing part in the liquefied gas storage tank according to the sixteenth embodiment of the present disclosure.
- [61] FIG. 37 is a partial exploded perspective view of a corner structure of the liquefied gas storage tank according to the seventeenth embodiment of the present disclosure.
- [62] FIG. 38 is a front view of the corner structure of the liquefied gas storage tank
20 according to the seventeenth embodiment of the present disclosure.
- [63] FIG. 39 is a cross-sectional view of the corner structure of the liquefied gas storage tank according to the seventeenth embodiment of the present disclosure.
- [64] FIG. 40 is a partial perspective view for explaining a side opening formed in the

liquefied gas storage tank according to the nineteenth embodiment of the present disclosure.

[65] FIG. 41 is a partial perspective view for explaining that a sealing plate is connected to the side opening formed in the liquefied gas storage tank according to the nineteenth embodiment of the present disclosure.

5 [66] FIG. 42 is a partial perspective view for explaining that the side opening formed in the liquefied gas storage tank according to the nineteenth embodiment of the present disclosure is covered.

[67] FIG. 43 is a partial perspective view for explaining that a sealing plate is connected to the side opening formed in the liquefied gas storage tank according to the twentieth
10 embodiment of the present disclosure.

[68] FIG. 44 is a partial perspective view for explaining that a sealing plate is connected to a primary barrier at the side opening formed in the liquefied gas storage tank according to the twentieth embodiment of the present disclosure.

[69] FIG. 45 is a partial perspective view for explaining that the side opening formed in the
15 liquefied gas storage tank according to the twentieth embodiment of the present disclosure is covered.

[70] FIG. 46 is a partial perspective view for explaining a side opening formed in the liquefied gas storage tank according to the twenty-first embodiment of the present disclosure.

[71] FIG. 47 is a view for explaining a process of covering an outer gap adjacent to the side
20 opening formed in the liquefied gas storage tank according to the twenty-first embodiment of the present disclosure.

[72] FIG. 48 is a view for explaining a process of covering an inner gap adjacent to the side opening formed in the liquefied gas storage tank according to the twenty-first embodiment of

the present disclosure.

[Best Modes of the Invention]

[73] The objects, specific advantages, and novel features of the present disclosure will become more apparent from the following detailed description and preferred embodiments
5 taken in conjunction with the accompanying drawings. In the present specification, in assigning reference numerals to components in the drawings, it should be noted that, for the same components, the same reference numerals are used as much as possible, even if they appear in different drawings.

[74] Of course, even the same constituent elements may be indicated by different reference
10 numerals in different drawings or different embodiments. That is, even when the reference numerals are the same, they may indicate different constituent elements, and conversely, even when the reference numerals are different, they may indicate the same constituent elements.

[75] In addition, in describing the present disclosure, when it is determined that a detailed description of a related known technology may unnecessarily obscure the gist of the present
15 disclosure, the detailed description thereof will be omitted.

[76] In addition, the accompanying drawings are provided only to facilitate understanding of the embodiments disclosed in the present specification, and the technical spirit disclosed in the present specification is not limited by the accompanying drawings, and it should be understood that all modifications, equivalents, and substitutes falling within the spirit and
20 technical scope of the present disclosure are included.

[77] In addition, terms including ordinal numbers such as first and second may be used to describe various constituent elements, but the constituent elements are not limited by the order and the like. That is, the above terms are used only for the purpose of distinguishing one

constituent element from another constituent element.

[78] Hereinafter, in the present specification, the liquefied gas may be LNG. Although the following description will be made on the assumption that the liquefied gas is LNG, in the present disclosure, the liquefied gas may encompass all materials having a calorific value that have a boiling point lower than room temperature and are forcibly liquefied for storage, in addition to LNG (for example, LPG, ethane, hydrogen, ammonia, and the like).

[79] Hereinafter, preferred embodiments of the present disclosure will be described in detail with reference to the accompanying drawings.

[80]

[81] FIG. 1 is a view for explaining a liquefied gas storage tank according to a first embodiment of the present disclosure, FIG. 2 is a cross-sectional view for explaining a bottom portion of the liquefied gas storage tank according to the first embodiment of the present disclosure, FIG. 3 is a cross-sectional view for explaining a vertical portion of the liquefied gas storage tank according to the first embodiment of the present disclosure, FIG. 4 is a partial plan view for explaining the bottom portion of the liquefied gas storage tank according to the first embodiment of the present disclosure, and FIG. 5 is a partial plan view for explaining a plurality of unit elements provided in the bottom portion in the liquefied gas storage tank according to the first embodiment of the present disclosure.

[82] Referring to FIGS. 1 to 5, the liquefied gas storage tank 1 according to the first embodiment of the present disclosure is mounted at one location such as on land. At this time, the liquefied gas storage tank 1 may be of a membrane type in which a bulkhead structure of a structure provided on land forms an outer surface of the tank, or may be of an independent type in which the liquefied gas storage tank 1 is installed on land.

[83] The type of the liquefied gas storage tank 1 is not particularly limited, and a location

at which the liquefied gas storage tank 1 is installed (on land, on a deck of an offshore structure, or the like) is also not limited. However, the liquefied gas storage tank 1 according to the present disclosure may have a structure in which a thermal insulation layer is disposed toward an inner side.

5 [84] The liquefied gas storage tank 1 has a storage space. Liquefied gas may be stored in the storage space, and the liquefied gas may be LNG. Although the following description will be made on the assumption that the liquefied gas is LNG, in the present disclosure, the liquefied gas may encompass all materials having a calorific value that have a boiling point lower than room temperature and are forcibly liquefied for storage, in addition to LNG (LPG, ethane,
10 hydrogen, ammonia, and the like).

[85]

[86] In the present embodiment, a case in which the liquefied gas storage tank 1 is a storage tank for onshore use will be described.

[87] The liquefied gas storage tank 1 may comprise an outer tank 11 formed in a cylindrical
15 shape and an inner tank 12 installed on an inner surface and a bottom of the outer tank 11.

[88] The outer tank 11 may have a cylindrical shape. The outer tank 11 forms an outer appearance of the liquefied gas storage tank 1 by pouring concrete and the like to form a cylindrical tank body having a substantially dome-shaped cover.

[89] Since the inner tank 12 is a portion directly contacting the liquefied gas in a cryogenic
20 state, the inner tank 12 may be made of a material capable of withstanding cryogenic temperatures, such as cryogenic steel.

[90] The inner tank 12 may comprise a vertical portion 121 installed on an inner circumferential surface of the outer tank 11 and a bottom portion 122 installed on a bottom

surface of the outer tank 11.

[91] The vertical portion 121 and the bottom portion 122 may comprise thermal insulation walls 3, 3a, and 5 capable of blocking heat intrusion from the outside while withstanding an impact from the outside or an impact caused by liquefied gas sloshing therein, and barriers 2 and 4 capable of preventing leakage of the liquefied gas to the outside, which will be described in detail below.

[92] As illustrated in FIGS. 2 and 3, the vertical portion 121 and the bottom portion 122 may comprise a primary barrier 2 contacting the liquefied gas, a primary thermal insulation wall 3 installed outside the primary barrier 2, a secondary barrier 4 installed outside the primary thermal insulation wall 3, and a secondary thermal insulation wall 5 disposed outside the secondary barrier 4, and may be supported by the outer tank 11 through a mastic 6, which is an adhesive member installed between the secondary thermal insulation wall 5 and the outer tank 11, a stud 7, which is a fixing member, and the like.

[93] The vertical portion 121 may be configured identically to the bottom portion 122, but, as illustrated in FIG. 1, in a portion contacting the bottom portion 122, the vertical portion 121 may be configured identically to the bottom portion 122 up to a predetermined height, and the secondary barrier 4 disposed between the primary thermal insulation wall 3 and the secondary thermal insulation wall 5 may be omitted from a height greater than or equal to the predetermined height.

[94] That is, as illustrated in FIG. 3, the vertical portion 121 may be formed in a structure in which, from a height greater than or equal to the predetermined height, a secondary plywood 52 of the secondary thermal insulation wall 5, any one of a primary thermal insulation material 32 of the primary thermal insulation wall 3 and a secondary thermal insulation material 51 of the secondary thermal insulation wall 5, a primary plywood 31 of the primary thermal

insulation wall 3, and the primary barrier 2 are stacked. In addition, in the configuration of the bottom portion 122, the vertical portion 121 may omit the connection thermal insulation wall 3a and may connect adjacent unit thermal insulation panels through a panel joint member (reference numeral not shown).

5 [95] The inner tank 12 of the liquefied gas storage tank 1 may comprise a lower barrier finishing part installed at the vertical portion 121 at a predetermined height from the bottom portion 122 and fixing the secondary barrier 4 to the outer tank 11, and an upper barrier finishing part installed at an upper end of the vertical portion 121 and fixing the primary barrier 2 to the outer tank 11. The lower barrier finishing part may be variously configured, such as
10 the lower barrier finishing part 100 according to the third embodiment to be described later or the lower barrier finishing part 200 according to the fourth embodiment to be described later, and the upper barrier finishing part may be variously configured, such as the upper barrier finishing part 300 according to the fifth embodiment to be described later.

[96]

15 [97] The primary barrier 2 forms an accommodation space for accommodating the liquefied gas, which is a cryogenic material, and may be made of a metal material. For example, the metal material may be stainless steel, but is not limited thereto. The primary barrier 2, together with the secondary barrier 4, may prevent leakage of the liquefied gas to the outside.

[98] The primary barrier 2 may be fixedly coupled to an upper portion of the primary
20 thermal insulation wall 3 and installed to directly contact the liquefied gas, which is a cryogenic material stored in the liquefied gas storage tank 1.

[99] The primary barrier 2 may be formed of a corrugated membrane sheet having corrugations in a lattice shape.

[100] The primary thermal insulation wall 3 may be designed to block heat intrusion from

the outside while withstanding an impact from the outside or an impact caused by liquefied gas sloshing therein, and may be installed between the primary barrier 2 and the secondary barrier 4.

[101] The primary thermal insulation wall 3 may have a structure in which a primary plywood 31 and a primary thermal insulation material 32 are sequentially stacked outside the primary barrier 2.

[102] The primary plywood 31 may be installed between the primary barrier 2 and the primary thermal insulation material 32.

[103] The primary thermal insulation material 32 may be formed of a material having excellent thermal insulation performance and excellent mechanical strength, for example, polyurethane foam, so as to block heat intrusion from the outside while withstanding an impact from the outside or an impact caused by liquefied gas sloshing therein.

[104] A portion of the primary thermal insulation wall 3, the secondary barrier 4, and the secondary thermal insulation wall 5 may be stacked to form unit thermal insulation panels 53a and 53b. The unit thermal insulation panels 53a and 53b may be classified into regular thermal insulation panels 53a having a rectangular parallelepiped shape and irregular thermal insulation panels 53b having a planar shape of a triangle or a trapezoid and having a size smaller than that of the regular thermal insulation panels 53a.

[105] In the unit thermal insulation panels 53a and 53b, the width of the primary thermal insulation wall 3 may be smaller than the width of the secondary thermal insulation wall 5, and accordingly, a portion of the secondary barrier 4 may be exposed on both sides of the primary thermal insulation wall 3. The unit thermal insulation panels 53a and 53b may be arranged adjacent to each other, and in this case, a connection thermal insulation wall 3a may be installed in a space portion between the adjacent primary thermal insulation walls 3, that is, a space

portion in which the secondary barrier 4 is exposed.

[106] The secondary barrier 4 may be divided into a main barrier 41 and an auxiliary barrier 42, wherein the main barrier 41 is installed on an upper portion of the secondary thermal insulation wall 5 in the unit thermal insulation panels 53a and 53b, and the auxiliary barrier 42 is installed between the exposed main barrier 41 and the connection thermal insulation wall 3a. In this case, the auxiliary barrier 42 is provided to interconnect the main barriers 41 provided in the unit thermal insulation panels 53a and 53b adjacent to each other. That is, the unit thermal insulation panels 53a and 53b arranged adjacent to each other may be finished by the auxiliary barrier 42 stacked on the main barrier 41 and the connection thermal insulation wall 3a.

[107] The connection thermal insulation wall 3a may be provided in a form in which a connection plywood 31a and a connection thermal insulation material 32a are stacked.

[108] The connection plywood 31a may be installed between the primary barrier 2 and the connection thermal insulation material 32a.

[109] The connection thermal insulation material 32a may be formed of polyurethane foam between the connection plywood 31a and the auxiliary barrier 42 of the secondary barrier 4.

[110] The above-described connection thermal insulation wall 3a is installed to perform a role of blocking heat intrusion from the outside while sealing, together with the auxiliary barrier 42, a space portion generated between adjacent secondary thermal insulation walls 5 when the unit thermal insulation panels 53a and 53b are arranged adjacent to each other. The connection thermal insulation wall 3a may be manufactured in a panel form, that is, as a connection thermal insulation panel 3ab, and may be inserted and installed between adjacent primary thermal insulation walls 3.

[111] The secondary barrier 4 may be installed between the primary thermal insulation wall 3, including the connection thermal insulation wall 3a, and the secondary thermal insulation

wall 5, and may prevent leakage of the liquefied gas to the outside together with the primary barrier 2.

[112] The secondary barrier 4 at a lower end of the unit thermal insulation panels 53a and 53b may comprise the main barrier 41 as a single barrier, and the secondary barrier 4 at a lower
5 end of the connection thermal insulation wall 3a may comprise the main barrier 41 interconnecting the unit thermal insulation panels 53a and 53b and the auxiliary barrier 42 provided on the secondary thermal insulation walls 5 forming the unit thermal insulation panels 53a and 53b.

[113] The secondary thermal insulation wall 5 may be designed to withstand an impact from
10 the outside or an impact caused by liquefied gas sloshing therein while blocking heat intrusion from the outside together with the primary thermal insulation wall 3 and the connection thermal insulation wall 3a.

[114] The secondary thermal insulation wall 5 may be installed between the secondary barrier 4 and the outer tank 11, and may have a structure in which a secondary thermal
15 insulation material 51 and a secondary plywood 52 are sequentially stacked outside the secondary barrier 4.

[115] The secondary thermal insulation material 51 may be formed of a material having excellent thermal insulation performance and excellent mechanical strength, for example, polyurethane foam, so as to block heat intrusion from the outside while withstanding an impact
20 from the outside or an impact caused by liquefied gas sloshing therein.

[116] The secondary plywood 52 may be installed between the secondary thermal insulation material 51 and the outer tank 11.

[117]

[118] The inner tank 12 of the liquefied gas storage tank for onshore use 1 according to the first embodiment of the present disclosure is positioned along an inner circumferential surface of the outer tank 11 along a perimeter thereof, forms a sealed storage space, and may have a polygonal shape. That is, the vertical portion 121 of the inner tank 12 in the liquefied gas storage tank for onshore use 1 may have a polygonal shape. In this case, the bottom portion 122 may have a perimeter formed in a polygon corresponding to the polygon of the vertical portion 121 and may be connected to a lower end of the vertical portion 121.

[119] In the present embodiment, the primary barrier 2 may be classified into a regular barrier 2 and an irregular barrier 2. The regular barrier 2 may have a rectangular planar shape, and the irregular barrier 2 may be connected to the regular barrier 2 and may have a triangular or trapezoidal planar shape.

[120] Corrugations having a lattice shape are provided in the primary barrier 2, and a pitch between the corrugations may be several hundred millimeters. The corrugations having the lattice shape may be classified into horizontal corrugations 21, longitudinal corrugations 22, vertical corrugations 23, and horizontal corrugations 24. The horizontal corrugations 21 and the longitudinal corrugations 22 are corrugations provided in the primary barrier 2 of the bottom portion 122, and the vertical corrugations 23 and the horizontal corrugations 24 are corrugations provided in the primary barrier 2 of the vertical portion 121.

[121] However, the horizontal corrugations 21 of the bottom portion 122 may have a circular or polygonal shape centered on the center of the bottom portion 122, and the longitudinal corrugations 22 of the bottom portion 122 may extend radially from the center of the bottom portion 122. That is, the horizontal corrugations 21 and the longitudinal corrugations 22 of the bottom portion 122 may form a spider-web shape, and the horizontal corrugations and the longitudinal corrugations may not necessarily intersect each other at right angles.

[122] In addition, the unit thermal insulation panels 53a and 53b are formed by the primary thermal insulation wall 3 and the secondary thermal insulation wall 5, and the unit thermal insulation panels 53a and 53b may be provided to correspond to the shape of the regular barrier 2 or the irregular barrier 2 of the primary barrier 2. That is, when the regular barrier 2 is applied as the primary barrier 2, the regular thermal insulation panel 53a may be provided to correspond thereto, and when the irregular barrier 2 is applied as the primary barrier 2, the irregular thermal insulation panel 53b may be provided to correspond thereto. In the present embodiment, it is described that the shapes of the unit thermal insulation panels 53a and 53b correspond to the shape of the primary barrier 2, but the present disclosure is not limited thereto.

[123] In addition, in the present embodiment, the regular thermal insulation panel 53a has a rectangular planar shape and may comprise a first regular thermal insulation panel 53a1 and a second regular thermal insulation panel 53a2, which are two types having different sizes. The first regular thermal insulation panel 53a1 may be larger than the second regular thermal insulation panel 53a2.

[124] The irregular thermal insulation panel 53b has a triangular or trapezoidal planar shape of various sizes and may comprise a first irregular thermal insulation panel 53b1 and a second irregular thermal insulation panel 53b2, which are two types having different sizes. The first irregular thermal insulation panel 53b1 is larger than the second irregular thermal insulation panel 53b2. In addition, the first irregular thermal insulation panel 53b1 and the second irregular thermal insulation panel 53b2 may be smaller than the regular thermal insulation panel 53a.

[125]

[126] As illustrated in FIG. 4 and the like, the bottom portion 122 according to the present embodiment has a plurality of unit elements UE having an isosceles triangular shape and

radially divided with respect to the center of the bottom portion 122. The unit elements UE may be virtual and may not be structurally visible configurations.

[127] Referring to FIGS. 4 and 5, a plurality of regular thermal insulation panels 53a and a plurality of irregular thermal insulation panels 53b may be installed on a bottom surface of the outer tank 11 in the bottom portion 122, and in each unit element UE, the plurality of regular thermal insulation panels 53a and the plurality of irregular thermal insulation panels 53b may be radially arranged from a vertex of the unit element UE corresponding to the center of the bottom portion 122 toward an outer side C opposite to the vertex.

[128] Since the unit element UE has an isosceles triangular shape, the unit element UE has a vertex angle θ at the vertex, and the number of polygons may vary according to the magnitude of the vertex angle θ .

[129] The bottom portion 122 may have a perimeter formed in a polygon and may be connected to a lower end of the vertical portion 121. The bottom portion 122 may be formed in a polygon corresponding to the number of unit elements UE.

[130] In the present embodiment, the outer side C of the unit element UE may be divided into three sections and formed to have a first outer side C1 on the left side, a second outer side C2 in the center, and a third outer side C3 on the right side, which are bent into three portions. That is, as the outer side C of the unit element UE is divided into three sections, the number of sides of the polygon forming the bottom portion 122 when based on the outer side C may be three times greater than the number of sides of the polygon forming the bottom portion 122 when based on the unit element UE. For example, when the number of unit elements UE is 16, the bottom portion 122 is formed as a 16-sided polygon before the outer side C of each unit element UE is divided into three sections, but when the outer side C of each unit element UE is divided into three sections, the bottom portion 122 may be formed as a 48-sided polygon.

[131] At this time, the vertical portion 121 may be formed to have a polygon (for example, a 48-sided polygon) corresponding to three times the polygon (for example, a 16-sided polygon) corresponding to the number of unit elements UE, corresponding to the outer side C of the bottom portion 122 being bent into three portions.

5 [132] When the outer side C of the unit element UE is formed as the first outer side C1 on the left side, the second outer side C2 in the center, and the third outer side C3 on the right side, in an area corresponding to the second outer side C2 in the center, the regular thermal insulation panels 53a may be arranged not only in an area adjacent to the vertical portion 121 but also in most areas, thereby reducing the number of irregular thermal insulation panels 53b to be
10 arranged, and in areas corresponding to the first outer side C1 on the left side and the third outer side C3 on the right side, respectively, the regular thermal insulation panels 53a and the irregular thermal insulation panels 53b may be symmetrically arranged, thereby increasing arrangement work efficiency.

[133] In addition, triangular or rhombic irregular thermal insulation panels 53b may be
15 installed at portions where adjacent unit elements UE are in contact with each other.

[134] In the bottom portion 122, a plurality of regular barriers 2 may be installed on the plurality of regular thermal insulation panels 53a, and a plurality of irregular barriers 2 may be installed on the plurality of irregular thermal insulation panels 53b, wherein, in the unit element UE, the plurality of regular barriers 2 and the plurality of irregular barriers 2 may be radially
20 arranged from a vertex of the unit element UE corresponding to the center of the bottom portion 122 toward the outer side C opposite to the vertex. Triangular or rhombic irregular barriers 2 may be installed at portions where adjacent unit elements UE are in contact with each other.

[135] As described above, in the present embodiment, the bottom portion 122 has a plurality of unit elements UE having an isosceles triangular shape and radially divided with respect to

the center of the bottom portion 122, and a plurality of regular thermal insulation panels 53a, a plurality of irregular thermal insulation panels 53b, and a plurality of connection thermal insulation panels 3ab may be installed on the bottom surface of the outer tank 11 in each unit element UE.

5 [136]

[137] FIG. 6 is a partial plan view for explaining a bottom portion of the liquefied gas storage tank according to the second embodiment of the present disclosure, and FIG. 7 is a partial plan view for explaining thermal insulation walls and barriers provided in the bottom portion in the liquefied gas storage tank according to the second embodiment of the present disclosure.

10 [138] Hereinafter, descriptions will be focused on differences between the present embodiment and the foregoing embodiment, and descriptions omitted herein may be replaced with the foregoing descriptions. This applies to all embodiments of the present specification.

[139] Referring to FIGS. 6 and 7, in the liquefied gas storage tank 1 according to the second embodiment of the present disclosure, the vertical portion 121 has a polygonal shape, and the
15 vertical corrugations 23 of the primary barrier 2 may be provided at the same regular pitch in a circumferential direction. In addition, the bottom portion 122 has a perimeter formed in a polygon corresponding to the polygon of the vertical portion 121 and is connected to a lower end of the vertical portion 121.

[140] The bottom portion 122 may be divided into a first area 122a in which regular thermal
20 insulation walls (reference numeral not shown) and regular barriers 2a are arranged and a second area 122b in which irregular thermal insulation walls (reference numeral not shown) and irregular barriers 2b are arranged between the first area 122a and the vertical portion 121.

[141] The horizontal corrugations 21 of the bottom portion 122 are corrugations extending in a horizontal direction in the drawing, and the longitudinal corrugations 22 of the bottom

portion 122 are corrugations extending in a longitudinal direction in the drawing. That is, the horizontal corrugations 21 and the longitudinal corrugations 22 of the bottom portion 122 may form a lattice shape, and the horizontal corrugations and the longitudinal corrugations may intersect each other at right angles.

5 [142]

[143] In addition, unit thermal insulation panels are formed by the primary thermal insulation wall 3 and the secondary thermal insulation wall 5, and the unit thermal insulation panels are provided to correspond to shapes of the primary barrier 2. That is, when the regular barrier 2a is applied as the primary barrier 2, regular thermal insulation walls may be provided to
10 correspond thereto, and when the irregular barrier 2b is applied as the primary barrier 2, irregular thermal insulation walls may be provided to correspond thereto.

[144] The regular barrier 2a may have a standardized rectangular shape. The regular barrier 2a may be installed on the vertical portion 121 and may be arranged and installed in an orthogonal form in the first area 122a of the bottom portion 122. That is, the regular barrier 2a
15 may be installed in the vertical portion 121 and the first area 122a of the bottom portion 122, and the regular thermal insulation wall may be installed below the regular barrier 2a to correspond thereto.

[145] The non-regular barrier 2b may have various shapes separately manufactured from the regular barrier 2a. The non-regular barrier 2b may be arranged and installed in the second area
20 122b of the bottom portion 122. Here, the second area 122b may be an area in which non-regular thermal insulation walls and non-regular barriers 2b are arranged between the first area 122a and the vertical portion 121.

[146] In the present embodiment, as illustrated in FIG. 7, the regular thermal insulation walls formed to correspond to the regular barriers 2a have a rectangular planar cross-sectional shape

and are arranged orthogonally in the first area 122a, and may be arranged in a horizontally laid-down form.

[147] In a state in which the regular thermal insulation walls are arranged as described above, non-regular thermal insulation walls may be arranged in the second area 122b to correspond to the non-regular barriers 2b. As illustrated in FIG. 7, the arrangement form of the irregular thermal insulation walls may be variously configured.

[148] In at least the second area 122b of the bottom portion 122, a finishing member 25 disposed between the bottom portion 122 and the vertical portion 121 may vary according to a gap between an end of the vertical corrugation 23 of the vertical portion 121 and an end of the longitudinal corrugation 22 of the bottom portion 122 or a gap between the end of the vertical corrugation 23 of the vertical portion 121 and an end of the horizontal corrugation 21 of the bottom portion 122.

[149] The finishing member 25 may be a continuous bent member finishing a portion where corrugations are connected to each other because no gap exists, or may be an independent finishing cover, an overlapping finishing cover, or a continuous planar member finishing a portion where corrugations are not connected to each other because a gap exists.

[150] The finishing member 25 may finish a portion where the corrugations are not connected to each other by selecting an independent finishing cover, an overlapping finishing cover, or a continuous planar member according to a size of the gap, wherein the independent finishing cover may be applied when the size of the gap is greater than or equal to a preset first interval, the continuous planar member may be applied when the size of the gap is less than or equal to a preset second interval that is smaller than the first interval, and the overlapping finishing cover may be applied when the size of the gap is between the first interval and the second interval.

[151] The support structure 300 described with reference to FIGS. 8 to 29 below may correspond to the outer tank 11 described with reference to FIGS. 1 to 3.

[152]

[153] FIG. 8 is a view for explaining a vertical portion of the liquefied gas storage tank according to the third embodiment of the present disclosure, and FIGS. 9 and 10 are views for explaining a vertical portion of the liquefied gas storage tank according to the fourth embodiment of the present disclosure.

[154] Referring to FIGS. 4 and 5, the bottom portion 122 may be formed in a polygon corresponding to the number of unit elements UE, and the bottom portion 122 may be connected to a lower end of the vertical portion 121.

[155] That is, the bottom portion 122 may be formed in a polygon and may comprise bent portions, and the vertical portion 121 may be formed to have angles corresponding to the bent portions of the bottom portion 122.

[156] FIGS. 8 to 10 illustrate cross sections viewed from above the vertical portion, and illustrate a cross section of a portion of the vertical portion 121 including an angle, the vertical portion 121 having a polygonal shape corresponding to the bottom portion 122.

[157] The vertical portion 121 of the liquefied gas storage tank 1 has a structure configured identically to the bottom portion 122 from a portion in contact with the bottom portion 122 up to a predetermined height (for example, 5 m) (see FIG. 1).

[158] FIGS. 8 to 10 correspond to the above structure and may have the same structure as that of FIG. 2, but some of the constituent elements forming the vertical portion 121 are omitted.

[159] Specifically, FIGS. 8 to 10 illustrate a barrier 100 forming an accommodation space accommodating liquefied gas, which is a cryogenic material, a primary thermal insulation wall

3 provided to contact the barrier 100, a secondary thermal insulation wall 5 provided on an outer side of the primary thermal insulation wall 3, and a support structure 300 coupled to the secondary thermal insulation wall 5 by mastic 6. Other constituent elements, such as plywood illustrated in FIGS. 1 and 2, are omitted from the drawings. Although not illustrated, it is
5 needless to say that the above constituent elements may be included at the respective positions.
[160]

[161] According to the third embodiment illustrated in FIG. 8, in the liquefied gas storage tank 1, corners of the vertical portion 121 may be formed of a corner panel 102 having an angled shape and flat panels 104 having a flat shape and disposed on both sides of the corner
10 panel 102.

[162] The liquefied gas storage tank 1 may comprise a barrier 100 forming an accommodation space for storing liquefied gas and a plurality of thermal insulation walls 3 and 5 installed on the support structure 300 and provided on an outer side of the barrier 100.

[163] The plurality of thermal insulation walls 3 and 5 may comprise a primary thermal
15 insulation wall 3 contacting the barrier 100 and a secondary thermal insulation wall 5 disposed between the primary thermal insulation wall 3 and the support structure 300. The panels are composed of the primary thermal insulation wall 3 and the secondary thermal insulation wall 5 and may comprise a corner panel 102 and a flat panel 104.

[164] The barrier 100 may be provided on an inner side of the primary thermal insulation
20 wall 3, and a fixing barrier 120 may be further provided on an inner side of the barrier 100. In this case, the fixing barrier 120 may have a structure fixed to the barrier 100 by using a fixing part 108.

[165] Although not illustrated, when the corner panels 102 and the flat panels 104 are arranged to form the vertical portion 121, it is needless to say that the primary thermal

insulation wall 3 should also be disposed in a spaced space formed between the primary thermal insulation walls 3 disposed in the respective panels 102 and 104.

[166] In the case of the third embodiment, the corner panels 102 and the flat panels 104 should be manufactured separately, and after the respective panels 102 and 104 are arranged,
5 the primary thermal insulation wall 3 should be additionally disposed in the spaced space, and thus construction work is not particularly easy.

[167] In addition, as illustrated, heat paths 106 are formed between the secondary thermal insulation walls 5 forming the respective panels 102 and 104, and since the heat paths 106 are formed between adjacent secondary thermal insulation walls 5, there is a problem in that
10 significant thermal convection occurs along the plurality of heat paths 106.

[168]

[169] FIGS. 9 and 10 are views illustrating the fourth embodiment. According to the fourth embodiment, the vertical portion 121 of the liquefied gas storage tank 1 may be formed of flat panels 104.

15 [170] FIG. 9 illustrates a state before the connection thermal insulation walls 3a are inserted, and FIG. 10 illustrates a state in which the connection thermal insulation walls 3a are inserted between the primary thermal insulation walls 3. The fourth embodiment is intended to improve the problems of the third embodiment.

[171] The liquefied gas storage tank 1 according to the fourth embodiment may comprise a
20 barrier 100 forming an accommodation space for storing liquefied gas and a plurality of thermal insulation walls 3, 5, and 3a installed on the support structure 300 and provided on an outer side of the barrier 100.

[172] The thermal insulation walls 3, 5, and 3a may comprise a primary thermal insulation

wall 3 contacting the barrier 100 and a secondary thermal insulation wall 5 disposed between the primary thermal insulation wall 3 and the support structure 300.

[173] A spacing portion 114 may be provided between the primary thermal insulation wall 3 disposed parallel to the first surface and the primary thermal insulation wall 3 disposed parallel to the second surface.

[174] The support structure 300 may comprise a first surface and a second surface bendably connected to the first surface, and the thermal insulation walls 3, 5, and 3a may further comprise a connection thermal insulation wall 3a provided between the primary thermal insulation wall 3 of the first surface and the primary thermal insulation wall 3 of the second surface.

[175] The connection thermal insulation wall 3a may be disposed in the spacing portion 114. The connection thermal insulation wall 3a may be provided such that an outer surface facing the support structure 300 is bent due to an angle formed by the angle of the vertical portion 121, and an inner surface of the connection thermal insulation wall 3a may have a structure bent parallel to the outer surface.

[176] A fixing barrier 120 may be further provided on an inner side of the barrier 100 provided on an inner side of the connection thermal insulation wall 3a.

[177] The fixing barrier 120 may be further disposed on the bent inner surface of the connection thermal insulation wall 3a. As illustrated, the fixing barrier 120 may have a structure in which corrugations are formed toward an inner side.

[178] At this time, the fixing barrier 120 may be fixed to the barrier 100 by using a fixing part 108. As an example, the fixing part 108 may be a welded portion formed by membrane welding.

[179] The thermal insulation walls 3 and 5 provided on the first surface and the thermal insulation walls 3 and 5 provided on the second surface may be provided such that side surfaces

facing each other are parallel to a reference line 112 bisecting the first surface and the second surface.

[180] Accordingly, each primary thermal insulation wall 3 disposed on both sides of the spacing portion 114 and both side surfaces of the connection thermal insulation wall 3a inserted
5 into the spacing portion 114 and disposed adjacent to the primary thermal insulation walls 3 may be cut along the cutting lines 113 illustrated in FIG. 9.

[181] Chambering the connection thermal insulation wall 3a and the primary thermal insulation walls 3 contacting the connection thermal insulation wall 3a means removing portions of the structure along the cutting lines 113 parallel to the reference line 112.

10 [182] As a result, as illustrated in FIG. 10, side surfaces of the primary thermal insulation walls 3 and the secondary thermal insulation walls 5 disposed adjacent to the reference line 112 may all be provided parallel to the reference line 112. That is, side surfaces of the primary thermal insulation walls 3 facing the spacing portion 114, side surfaces of the secondary thermal insulation walls 5, and both side surfaces of the connection thermal insulation wall 3a
15 may have a structure parallel to the reference line 112.

[183] Thickness lines 116 extending perpendicular to inner and outer sides of the thermal insulation walls 3 and 5 may have a structure inclined with respect to the reference line 112.

[184] In the case of the fourth embodiment, construction efficiency may be improved compared to the third embodiment in that the corner panels 102 are eliminated and portions
20 forming angles of the vertical portion 121 may be constructed using only the flat panels 104. That is, manufacturing costs may be reduced because the corner panels 102 do not need to be separately manufactured, and constructability may be improved by constructing the structure using only the flat panels 104.

[185] In addition, the number of heat paths 106 generated between the secondary thermal

insulation walls 5 may be reduced, thereby minimizing the occurrence of thermal convection.

[186]

[187] The vertical portion 121 of the liquefied gas storage tank 1 corresponds to a structure disposed at a predetermined height (for example, 5 m) or more above a portion in contact with the bottom portion 122 and has a structure partially different from that of the bottom portion 122 (see FIG. 1).

[188] The vertical portions 121 illustrated in FIGS. 11 to 29, which will be described below, correspond to structures disposed at a predetermined height (for example, 5 m) or more above portions in contact with the bottom portion 122 and correspond to structures in which a single thermal insulation wall is disposed, and thus may have a structure in which the secondary barrier 4 disposed between the primary thermal insulation wall 3 and the secondary thermal insulation wall 5 is omitted (see FIG. 3).

[189] FIGS. 11 to 29 described below may have the same structure as that of FIG. 3. Although some constituent elements are omitted from the drawings, it is needless to say that the structures may comprise the constituent elements disposed at the respective positions as illustrated in FIG. 3.

[190]

[191] FIG. 11 is a view for explaining a thermal convection problem occurring in a vertical portion of a conventional liquefied gas storage tank.

[192] FIG. 11(a) is a view illustrating a cross section of the vertical portion of the liquefied gas storage tank 1, and FIG. 11(b) is a view illustrating a cross section taken along line S1 of FIG. 11(a).

[193] First, referring to FIG. 11(a), a conventional vertical portion generally has a structure

comprising a barrier 100 forming an accommodation space for storing liquefied gas and a thermal insulation wall 200 provided between the barrier 100 and the support structure 300. The thermal insulation wall 200 may have a structure fixed to the support structure 300 by mastic 6 and studs 7.

5 [194] The thermal insulation wall 200 may comprise a primary plywood 31 disposed to contact the barrier 100 and a secondary plywood 52 disposed toward the support structure 300, which are disposed on both sides of an insulation material 210.

[195] A gap may be provided between the thermal insulation walls 200, and an insertion thermal insulation material 220 may be inserted into the gap. The insertion thermal insulation
10 material 220 may comprise glass wool.

[196] However, when installation of the insertion thermal insulation material 220 is insufficient or when the insertion thermal insulation material 220 is in a cryogenic state, a gap may be generated around the insertion thermal insulation material 220 due to thermal contraction of the thermal insulation material 210. The gap is generated because the amount of
15 thermal contraction and the amount of thermal expansion of the thermal insulation material 210 and the insertion thermal insulation material 220 are different from each other.

[197] In the case of FIG. 11, there is a problem in that thermal convection occurs from the barrier 100 toward the support structure 300 through the above gap. Additionally, thermal convection may also occur due to a temperature difference from a section in which the mastic
20 6 is disposed between the thermal insulation wall 200 and the support structure 300.

[198] The thermal convection generated as described above may move through a space between the support structure 300 and the thermal insulation wall 200, as illustrated in FIGS. 11(a) and 11(b). Between the thermal insulation wall 200 and the support structure 300, an additional structure for blocking thermal convection is sometimes disposed in a portion of a

section in which the mastic 6 is disposed, but this is insufficient to prevent the thermal convection phenomenon described above.

[199] The liquefied gas storage tank 1 according to the present disclosure, which will be described below with reference to FIGS. 12 to 18, is intended to improve the thermal convection problem generated through the gap of the conventional insertion thermal insulation material 220 described above (particularly, the thermal convection phenomenon occurring between the thermal insulation wall 200 and the support structure 300).

[200]

[201] FIG. 12 is a cross-sectional view for explaining a vertical portion of the liquefied gas storage tank according to the fifth embodiment of the present disclosure, FIG. 13 is a partial cross-sectional view for explaining a manufacturing process of a connection thermal insulation material in the liquefied gas storage tank according to the fifth embodiment of the present disclosure, and FIG. 14 is a view illustrating a cross section taken along line S2 in the vertical portion of the liquefied gas storage tank according to FIG. 12.

[202] According to the fifth embodiment illustrated in FIGS. 12 to 15, the liquefied gas storage tank 1 may comprise a barrier 100 forming an accommodation space for storing liquefied gas, a plurality of thermal insulation walls 200 provided on an outer side of the barrier 100, and insertion insulation materials 220 inserted into gaps between adjacent thermal insulation walls 200.

[203] The plurality of thermal insulation walls 200 may comprise primary plywoods 31 disposed on surfaces facing the barrier 100 and secondary plywoods 52 disposed on surfaces facing the support structure 300.

[204] Referring to FIG. 12, the plurality of thermal insulation walls 200 may have stepped portions formed at portions facing each other on surfaces facing the support structure 300.

[205] In addition, the liquefied gas storage tank 1 may further comprise a connection thermal insulation material 32a provided at the stepped portions and disposed adjacent to the support structure 300, wherein the connection thermal insulation material 32a overlaps the insertion thermal insulation material 220 in an inward-outward direction.

5 [206] Specifically, in the plurality of thermal insulation walls 200, a stepped portion having a height of a may be provided from a lower surface of the thermal insulation wall 200 adjacent to the support structure 300 toward the barrier 100, and a height b of the connection thermal insulation material 32a, which is in a direction parallel to the height of the stepped portion, may be greater than or equal to a. Accordingly, the connection thermal insulation material 32a may
10 be disposed to protrude from the thermal insulation wall 200 by a predetermined distance.

[207] The connection thermal insulation material 32a may comprise connection plywood 31a disposed on a lower surface facing the support structure 300 and glass wool 222 disposed on an upper surface.

[208] The glass wool 222 serves to block a gap located on a path from the insertion thermal
15 insulation material 220 toward a space between the support structure 300 and the thermal insulation wall 200, and the glass wool 222 may be disposed for step adjustment.

[209] The connection plywood 31a may be disposed to fix the connection thermal insulation material 32a to the support structure 300 through a first fastening part 420.

[210] FIG. 14(a) is a view illustrating the vertical portion 121 of the liquefied gas storage
20 tank according to FIG. 12, and FIG. 14(b) is a view illustrating a cross section taken along line S2 of FIG. 14(a).

[211] As illustrated in FIG. 14(a), as the connection thermal insulation material 32a is disposed in the stepped portion formed on an outer side of the insertion thermal insulation material 220, the connection plywood 31a of the connection thermal insulation material 32a

may be seen in FIG. 14(b). A portion in which the connection plywood 31a is visible in FIG. 14(b) corresponds to an area in which the insertion thermal insulation material 220 was visible in FIG. 11.

[212] As a result, as the connection thermal insulation material 32a is disposed to protrude
5 toward the barrier 100, thermal convection flowing from the insertion thermal insulation material 220 and thermal convection occurring between the thermal insulation wall 200 and the support structure 300 may be blocked.

[213] In particular, even when a gap or the like is generated in the insertion thermal insulation material 220 and the thermal convection blocking function thereof is lost, the connection
10 thermal insulation material 32a may block thermal convection, and thus the thermal convection phenomenon as illustrated in FIG. 11 does not occur.

[214] That is, there is an effect of blocking thermal convection in both vertical and horizontal directions as illustrated in FIG. 11.

[215] Referring to FIG. 12, the plurality of thermal insulation walls 200 and the support
15 structure 300 may be fastened through fastening members 400.

[216] The fastening members 400 may comprise main fastening parts 410 comprising the mastic 6 and the studs 7 and a first fastening part 420 fastening the connection thermal insulation material 32a and the support structure 300. The first fastening part 420 may comprise stud bolts 7 and 660 and nuts 662 coupled thereto.

[217] One side of the first fastening part 420 may be fixed to the support structure 300, and
20 the other side thereof may pass through the connection plywood 31a and be fixed inside the connection thermal insulation material 32a.

[218] FIG. 13 is an enlarged view illustrating the connection thermal insulation material 32a in order to explain a manufacturing process and an arrangement process of the connection

thermal insulation material 32a.

[219] After the support structure 300 is constructed and before the thermal insulation walls 200 are disposed on the support structure 300, the connection thermal insulation material 32a may be disposed on the support structure 300. Thereafter, the thermal insulation walls 200
5 having stepped portions formed therein may be fastened to the support structure 300.

[220] As illustrated in FIG. 13, the connection thermal insulation material 32a may be manufactured to have a structure in which a portion thereof is penetrated, including a portion to which the first fastening part 420 is fastened. The glass wool 222 may be disposed before the penetrated structure is formed.

10 [221] Through the penetrated structure, the nuts 662 may be coupled to the stud bolts 660 protruding from the connection thermal insulation material 32a, and after the nuts 662 are coupled, the connection thermal insulation material 32a may be inserted into and fill the penetrated portion.

[222] Thereafter, the thermal insulation walls 200 having stepped portions formed therein
15 may be fastened to the support structure 300, and then the glass wool 222 may be further filled onto a surface of the connection thermal insulation material 32a through the insertion thermal insulation material 220.

[223] In FIGS. 12 to 14, the first fastening part 420 fastening the connection thermal insulation material 32a and the support structure 300 is illustrated as a coupling between the
20 stud bolts 660 and the nuts 662, but the present disclosure is not limited thereto. The connection thermal insulation material 32a and the support structure 300 may be bonded and fastened by the mastic 6.

[224]

[225] FIG. 15 is a cross-sectional view for explaining a vertical portion of the liquefied gas storage tank according to the sixth embodiment of the present disclosure, and FIG. 16 is a view illustrating a cross section taken along line S3 in the vertical portion of the liquefied gas storage tank according to FIG. 15.

5 [226] According to the sixth embodiment illustrated in FIG. 15, the liquefied gas storage tank 1 may comprise a barrier 100 forming an accommodation space for storing liquefied gas, a plurality of thermal insulation walls 200 provided on an outer side of the barrier 100, and insertion insulation materials 220 inserted into gaps between adjacent thermal insulation walls 200.

10 [227] The plurality of thermal insulation walls 200 may comprise primary plywoods 31 disposed on surfaces facing the barrier 100 and secondary plywoods 52 disposed on surfaces facing the support structure 300.

[228] As in FIG. 12, the plurality of thermal insulation walls 200 may have stepped portions formed at portions facing each other on surfaces facing the support structure 300.

15 [229] In addition, the liquefied gas storage tank 1 may further comprise a connection thermal insulation material 32a provided at the stepped portions and disposed adjacent to the support structure 300, wherein the connection thermal insulation material 32a overlaps the insertion thermal insulation material 220 in an inward-outward direction.

[230] Specifically, in the plurality of thermal insulation walls 200, a stepped portion having
20 a height of a may be provided from a lower surface of the thermal insulation wall 200 adjacent to the support structure 300 toward the barrier 100, and a height b of the connection thermal insulation material 32a, which is in a direction parallel to the height of the stepped portion, may be greater than or equal to a. Accordingly, the connection thermal insulation material 32a may be disposed to protrude from the thermal insulation wall 200 by a predetermined distance.

[231] The connection thermal insulation material 32a may comprise connection plywood 31a disposed on a lower surface facing the support structure 300 and glass wool 222 disposed on an upper surface.

[232] The glass wool 222 serves to block a gap located on a path from the insertion thermal insulation material 220 toward a space between the support structure 300 and the thermal insulation wall 200, and the glass wool 222 may be disposed for step adjustment.

[233] The connection plywood 31a may be disposed to fix the connection thermal insulation material 32a to the support structure 300.

[234] Unlike FIG. 12, according to FIG. 15, the sixth embodiment differs from the fifth embodiment in that the connection plywood 31a is not directly fastened to the support structure 300.

[235] According to the sixth embodiment of FIG. 15, the liquefied gas storage tank 1 may further comprise a plurality of plates 432 disposed between the connection plywood 31a and the support structure 300, wherein at least a portion of each of the plurality of plates 432 is disposed to overlap the connection plywood 31a.

[236] The fastening members 400 may comprise main fastening parts 410, each having one side fixed to the support structure 300 and the other side passing through the secondary plywood 52 and being fixed inside the thermal insulation wall 200, a plurality of plates 432 disposed between the connection plywood 31a and the support structure 300, and second fastening parts 430 fastening the connection plywood 31a and the plurality of plates 432. Here, the main fastening parts 410 are fastening members generally used for fastening the thermal insulation walls 200 and the support structure 300.

[237] In the fifth embodiment, in order to fix the connection thermal insulation material 32a to the support structure 300, a separate first fastening part 420, rather than the main fastening

part 410, had to be used to fasten the connection thermal insulation material 32a and the support structure 300.

[238] In contrast, the sixth embodiment has an advantage in that the main fastening parts 410 are utilized and thus there is no need to additionally provide separate first fastening parts 420.

5 However, there is an inconvenience in that an additional construction operation using the second fastening parts 430 is required in order to fix the plates 432 to the connection plywood 31a of the connection thermal insulation material 32a.

[239] The additional construction operation refers to an operation of forming grooves in the connection plywood 31a and then riveting the second fastening parts 430 in the grooves.

10 [240] FIG. 16 is a view illustrating a cross section taken along line S3 indicated in the vertical portion of the liquefied gas storage tank 1 illustrated in FIG. 15.

[241] As illustrated in FIG. 15, as the connection thermal insulation material 32a is disposed in the stepped portion formed on an outer side of the insertion thermal insulation material 220, it may be confirmed in FIG. 16 that the connection plywood 31a of the connection thermal
15 insulation material 32a is visible.

[242] In FIG. 16, unlike FIG. 14(b), the first fastening parts 420 are omitted, and the plates 432 and the second fastening parts 430 are additionally disposed.

[243] The fifth embodiment and the sixth embodiment differ in the fastening structure of the connection thermal insulation material 32a, and the effects of the sixth embodiment are the
20 same as those of the fifth embodiment illustrated in FIGS. 12 to 14. As a result, as the connection thermal insulation material 32a is disposed, there is an effect in that the thermal convection phenomenon as illustrated in FIG. 11 does not occur. That is, there is an effect of blocking thermal convection in both vertical and horizontal directions as illustrated in FIG. 11.

[244]

[245] FIG. 17 is a cross-sectional view for explaining a vertical portion of the liquefied gas storage tank according to the seventh embodiment of the present disclosure, and FIG. 18 is a view illustrating a cross section taken along line S4 in the vertical portion of the liquefied gas storage tank according to FIG. 17.

5 [246] According to the seventh embodiment illustrated in FIG. 17, the liquefied gas storage tank 1 may comprise a barrier 100 forming an accommodation space for storing liquefied gas, a plurality of thermal insulation walls 200 provided on an outer side of the barrier 100, and insertion thermal insulation materials 220 inserted into gaps between adjacent thermal insulation walls 200.

10 [247] The plurality of thermal insulation walls 200 may comprise primary plywoods 31 disposed on surfaces facing the barrier 100 and secondary plywoods 52 disposed on surfaces facing the support structure 300.

[248] As in FIG. 12, the plurality of thermal insulation walls 200 may have stepped portions formed at portions facing each other on surfaces facing the support structure 300.

15 [249] In addition, the liquefied gas storage tank 1 may further comprise a connection thermal insulation material 32a provided at the stepped portions and disposed adjacent to the support structure 300, wherein the connection thermal insulation material 32a overlaps the insertion thermal insulation material 220 in an inward-outward direction.

[250] Specifically, in the plurality of thermal insulation walls 200, a stepped portion having
20 a height of a may be provided from a lower surface of the thermal insulation wall 200 adjacent to the support structure 300 toward the barrier 100, and a height b of the connection thermal insulation material 32a, which is in a direction parallel to the height of the stepped portion, may be greater than or equal to a. Accordingly, the connection thermal insulation material 32a may be disposed to protrude from the thermal insulation wall 200 by a predetermined distance.

[251] The connection thermal insulation material 32a may comprise a connection plywood 31a disposed on a lower surface facing the support structure 300 and glass wool 222 disposed on an upper surface.

[252] The glass wool 222 serves to block a gap located on a path from the insertion thermal insulation material 220 toward a space between the support structure 300 and the thermal insulation wall 200, and the glass wool 222 may be disposed for step adjustment. The connection plywood 31a may be disposed to fix the connection thermal insulation material 32a to the support structure 300.

[253] In the case of FIG. 12 (the fifth embodiment), the first fastening part 420 had to be additionally provided separately from the main fastening part 410, whereas according to FIG. 17 (the seventh embodiment), the seventh embodiment differs in that the connection thermal insulation material 32a is fastened to the support structure 300 only by the main fastening part 410.

[254] In addition, in the case of FIG. 15 (the sixth embodiment), separate plates 432 and second fastening parts 430 were required, whereas in the case of FIG. 17 (the seventh embodiment), there is a further advantage in that separate plates 432 and second fastening parts 430 are not required.

[255] Referring to FIG. 17, the connection plywood 31a comprised in the connection thermal insulation material 32a may have an area greater than or equal to an area of a lower surface of the connection thermal insulation material 32a.

[256] Specifically, the connection plywood 31a may have a structure comprising a first area 442 corresponding to the lower surface of the connection thermal insulation material 32a and a second area 444 corresponding to an area outside the lower surface of the connection thermal insulation material 32a.

[257] In the seventh embodiment, the fastening members 400 fastening the connection thermal insulation material 32a to the support structure 300 may be the main fastening parts 410.

[258] The main fastening parts 410 may be studs 7, each having one side fixed to the support structure 300 and the other side passing through the second area 400 of the connection plywood 31a and the secondary plywood 52 and being fixed inside the thermal insulation wall 200.

[259] FIG. 18 is a view illustrating a cross section taken along line S4 indicated in the vertical portion of the liquefied gas storage tank 1 illustrated in FIG. 17.

[260] As illustrated in FIG. 17, as the connection thermal insulation material 32a is disposed in the stepped portion formed on an outer side of the insertion thermal insulation material 220, it may be confirmed in FIG. 18 that the connection plywood 31a of the connection thermal insulation material 32a is visible.

[261] Unlike FIG. 14(b) and FIG. 16, the first fastening parts 420 and the second fastening parts 430 are omitted, and the structure is fastened only by the main fastening parts 410.

[262] In the case of FIG. 17 (the seventh embodiment), an enlarged connection plywood 31a is used in a structure in which the connection thermal insulation material 32a is fastened by using the main fastening parts 410, which may be confirmed through the connection plywood 31a (444) illustrated in FIG. 18.

[263] The fifth and sixth embodiments differ from the seventh embodiment in the fastening structure of the connection thermal insulation material 32a, and the effects of the seventh embodiment are the same as those of the fifth and sixth embodiments.

[264] As a result, as the connection thermal insulation material 32a is disposed adjacent to the support structure 300, there is an effect in that the thermal convection phenomenon as

illustrated in FIG. 11 (particularly, the thermal convection phenomenon occurring between the thermal insulation wall 200 and the support structure 300) does not occur. That is, there is an effect of blocking thermal convection in both vertical and horizontal directions as illustrated in FIG. 11.

5 [265]

[266] FIG. 19 is a cross-sectional view for explaining a vertical portion of the liquefied gas storage tank according to the eighth embodiment of the present disclosure, and FIG. 20 is an enlarged view illustrating a portion of the structure of the liquefied gas storage tank according to FIG. 19.

10 [267] In the conventional art as illustrated in FIG. 11, thermal convection occurs in an inward-outward direction of the thermal insulation wall 200 through the insertion thermal insulation material 220 of the thermal insulation wall 200.

[268] According to the eighth embodiment, an object is to block thermal convection in the inward-outward direction of the thermal insulation wall 200 by disposing the connection
15 thermal insulation material 32a adjacent to a direction in which the barrier 100 is disposed, as illustrated in FIG. 19.

[269] According to the eighth embodiment illustrated in FIG. 19, the liquefied gas storage tank 1 may comprise a barrier 100 forming an accommodation space for storing liquefied gas, a plurality of thermal insulation walls 200 provided on an outer side of the barrier 100, and
20 insertion thermal insulation materials 220 inserted into gaps between adjacent thermal insulation walls 200. The insertion thermal insulation materials 220 may comprise glass wool 222. As illustrated in FIG. 3, the barrier 100 is illustrated as comprising corrugations 110.

[270] In FIG. 19, the structure of the secondary plywood 52 is omitted for convenience of illustration, but it is needless to say that additional structures required for the vertical portion

121 may be further comprised as described above. In addition, although fastening between the thermal insulation wall 200 and the support structure 300 is illustrated only by the mastic 6, fastening may also be performed by using studs 7.

[271] FIG. 20 is a view illustrating an enlarged and rotated portion including the connection thermal insulation material 32a illustrated in FIG. 19. Referring to FIGS. 19 and 20, in the plurality of thermal insulation walls 200, the primary plywood 31 may be disposed on an inner side adjacent to the barrier 100, and a thermal insulation material 210 may be provided on an outer side of the primary plywood 31.

[272] The plurality of thermal insulation walls 200 may have stepped portions formed at portions facing each other on surfaces facing the barrier 100 and may comprise connection thermal insulation materials 32a provided at the stepped portions and overlapping the insertion thermal insulation materials 220 in an inward-outward direction.

[273] In addition, the liquefied gas storage tank 1 may further comprise fastening members 400 provided on surfaces of the connection thermal insulation materials 32a facing the barrier 100, wherein both ends of the fastening members 400 are fixed to surfaces of the thermal insulation walls 200.

[274] Plywood grooves 500 having a length may be provided in surfaces of the primary plywoods 31 disposed adjacent to the stepped portions, and the fastening members 400 may be inserted into the plywood grooves 500.

[275] The thermal insulation material 210 may have a stepped portion having a height of c from an upper surface adjacent to the barrier 100 toward a lower surface, and a height d of the connection thermal insulation material 32a, which is in a direction parallel to the height of the stepped portion, may be greater than or equal to c.

[276] When a distance corresponding to a difference between d and c is referred to as d1 and

a thickness of the primary plywood 31 is referred to as d_2 , a depth of the plywood groove 500 may be $d_2 - d_1$.

[277] That is, when a surface of the primary plywood 31 to which the connection thermal insulation material 32a is attached is referred to as an attachment surface, a stepped portion
5 having a depth of $d_2 - d_1$ may be formed in an area of the surface of the primary plywood 31 including an area overlapping the attachment surface.

[278] The fastening members 400 may be disposed such that the connection thermal insulation materials 32a are attached to central portions thereof, and both ends thereof may be inserted into the plywood grooves 500, wherein upper surfaces of the fastening members 400
10 inserted into the plywood grooves 500 may be disposed to be flush with upper surfaces of the primary plywoods 31.

[279] The connection thermal insulation materials 32a and the fastening members 400 may be disposed without protruding and may have a structure entirely accommodated within inner surfaces of the barriers 100 where the corrugations 110 are not formed.

15 [280] Both ends of the fastening members 400 may have a structure mechanically fastened by tacker fixing in end areas where the fastening members 400 overlap the primary plywoods 31 in a state in which the fastening members 400 are inserted into the plywood grooves 500.

[281] Lower portions of the connection thermal insulation materials 32a may be bonded to at least a portion of stepped surfaces formed in the thermal insulation walls 200 by an adhesive.

20 [282] The connection thermal insulation materials 32a provided on surfaces facing the barriers 100 (inner sides) are intended to block thermal convection in an inward-outward direction of the thermal insulation walls 200.

[283] This differs in structure and effect from the connection thermal insulation materials 32a provided on outer sides in FIGS. 12 to 18 described above, which are mainly intended to

block thermal convection flowing along spaces between the thermal insulation walls 200 and the support structures 300.

[284]

[285] FIG. 21 is a cross-sectional view for explaining a vertical portion of the liquefied gas storage tank according to the ninth embodiment of the present disclosure, and FIG. 22 is a view for explaining fastening members disposed on a surface of the liquefied gas storage tank according to FIG. 21.

[286] FIGS. 23 to 25 are cross-sectional views for explaining a manufacturing process of the liquefied gas storage tank according to FIG. 21. FIG. 23 is a view illustrating separated constituent elements in order to explain a configuration of the fastening members 400 of the liquefied gas storage tank 1 according to the ninth embodiment.

[287] According to the ninth embodiment illustrated in FIGS. 21 to 25, the liquefied gas storage tank 1 may comprise a barrier 100 forming an accommodation space for storing liquefied gas, a plurality of thermal insulation walls 200 provided on an outer side of the barrier 100, and insertion thermal insulation materials 220 inserted into gaps between adjacent thermal insulation walls 200.

[288] The plurality of thermal insulation walls 200 may have stepped portions formed at portions facing each other on surfaces facing the barrier 100 and may further comprise connection thermal insulation materials 32a provided at the stepped portions and overlapping the insertion thermal insulation materials 220 in an inward-outward direction and fastening members 400 provided on surfaces of the connection thermal insulation materials 32a facing the barrier 100 and slidably connected to surfaces of the thermal insulation walls 200.

[289] In FIG. 21 and FIGS. 23 to 25, the structure of the secondary plywood 52 is omitted for convenience of illustration, but it is needless to say that additional structures required for

the vertical portion 121 may be further comprised as described above.

[290] In addition, although fastening between the thermal insulation walls 200 and the support structure 300 is illustrated only by the mastic 6, it is needless to say that studs 7 may also be used.

5 [291] Primary plywoods 31 are disposed on surfaces of the plurality of thermal insulation walls 200 facing the barrier 100, and as illustrated in FIG. 21, the primary plywoods 31 may comprise a connection plywood 31a provided on a surface of the connection thermal insulation material 32a and fixed plywoods 510 disposed on surfaces of the plurality of thermal insulation walls 200.

10 [292] As in the eighth embodiment, the connection thermal insulation material 32a illustrated in the ninth embodiment is intended to block thermal convection in an inward-outward direction of the thermal insulation walls 200, the connection thermal insulation material 32a being provided on a surface facing the barrier 100 (an inner side).

[293] The difference between the embodiments lies in the structure of the fastening members
15 400 and a fastening method using the same when the connection thermal insulation material 32a is fixed to the thermal insulation walls 200.

[294] Referring to FIGS. 21 to 23, the fastening members 400 may comprise a pair of anchors 520 disposed to overlap the plywoods 31a and 510, a connection plate 530 disposed on surfaces of the pair of anchors 520 facing the barrier 100 such that one end and the other end thereof
20 overlap the respective anchors 520 of the pair of anchors 520, a pair of fixed fastening parts 540 provided at one end and the other end of the connection plate 530 and fastened to the connection plywood 31a through the connection plate 530 and the anchors 520, and a pair of movable fastening parts 550 provided at one end and the other end of the connection plate 530 and fastened to the fixed plywoods 510 through the connection plate 530 and the anchors 520.

[295] The pair of anchors 520 may be disposed in the connection plywood 31a and the pair of fixed plywoods 510 disposed adjacent to opposite sides of the connection plywood 31a such that one end of each anchor 520 overlaps a respective side of the connection plywood 31a and the other end thereof overlaps the corresponding fixed plywood 510.

5 [296] That is, the anchors 520 are disposed at opposite ends of the connection plywood 31a and are constituent elements required to connect the opposite ends of the connection plywood 31a to the respective fixed plywoods 510.

[297] The connection plate 530 and the pair of anchors 520 may be provided with a pair of first through-holes 552 through which the pair of fixed fastening parts 540 pass and a pair of
10 second through-holes 554 through which the pair of movable fastening parts 550 pass.

[298] Referring to FIGS. 22 and 23, the pair of first through-holes 552 may be disposed to overlap the surface of the connection plywood 31a, and the pair of second through-holes 554 may be disposed to overlap the surface of the fixed plywood 510.

[299] Since each first through-hole 552 formed in the connection plate 530 and the pair of
15 anchors 520 has a structure penetrated only to an extent sufficient for insertion of the fixed fastening part 540, both an upper end and a lower end of the fixed fastening part 540 may remain fixed in the first through-hole 552.

[300] Among the second through-holes 554 formed in the connection plate 530 and the pair of anchors 520, the second through-hole 554 formed in the connection plate 530 may comprise
20 a sliding hole 556, which is a hole having a length along a longitudinal direction of the connection plate 530. Here, the longitudinal direction means a direction parallel to the plywoods 31a and 510.

[301] In this case, the movable fastening part 550 may be slidably movable in the sliding hole 556 along the longitudinal direction.

[302] However, the second through-hole 554 formed in the anchor 520, to which a lower end of the movable fastening part 550 is fastened, has a structure penetrated only to an extent sufficient for insertion of the movable fastening part 550, and thus the lower end of the movable fastening part 550 may remain fixed in the second through-hole 554 of the anchor 520.

5 [303] That is, only the upper end of the movable fastening part 550 may be slidably movable within the sliding hole 556.

[304] The anchor 520 and the connection plate 530 may be doubly fastened by the fixed fastening part 540 and the movable fastening part 550 to increase fastening force.

[305] The reason why fastening force is increased through the double fastening while
10 allowing sliding movement of the movable fastening part 550 is to prevent stress concentration occurring in the fastening member 400 due to thermal contraction and expansion of the thermal insulation wall 200. Specifically, thermal stress is locally generated in the fastening member 400 due to contraction of the thermal insulation wall 200 in a low-temperature area, and the above structure is intended to alleviate such thermal stress.

15 [306] FIGS. 24 and 25 are views sequentially illustrating a process in which the constituent elements separated in FIG. 23 are coupled together.

[307] Referring to FIGS. 23 and 24, stepped portions are formed on surfaces of the connection plywood 31a and the fixed plywood 510 facing each other, and the anchors 520 may be inserted into the stepped portions. The stepped portions may have a depth
20 corresponding to the inserted anchors 520.

[308] First, as illustrated in FIG. 23, respective stepped portions for inserting the connection thermal insulation material 32a and the anchors 520 may be formed in the thermal insulation material 210 of the thermal insulation wall 200, the fixed plywood 510, and the connection plywood 31a. Thereafter, the structure may be manufactured according to FIGS. 24 and 25.

[309] FIG. 24(a) is a view illustrating a state in which the connection thermal insulation material 32a is inserted into the stepped portion provided in the thermal insulation wall 200. It may be confirmed that a stepped portion is also provided in the connection plywood 31a of the connection thermal insulation material 32a.

5 [310] FIG. 24(b) is a view illustrating a state in which the pair of anchors 520 is inserted into the stepped portions formed in the plywoods 31a and 510 in the state of FIG. 24(a). Each anchor 520 is provided with a first through-hole 552 and a second through-hole 554.

[311] FIG. 25(a) is a view illustrating a state in which the connection plate 530 is disposed on surfaces of the anchors 520 in the state of FIG. 24(b). The first through-holes 552 and the
10 second through-holes 554 provided in the connection plate 530 may be disposed to overlap the first through-holes 552 and the second through-holes 554 provided in the anchors 520.

[312] As described above, the second through-holes 554 provided in the connection plate 530 may have the form of sliding holes 556, and may have a larger opening size than the second through-holes 554 provided in the anchors 520.

15 [313] FIG. 25(b) illustrates a state in which the fixed fastening parts 540 and the movable fastening parts 550 are fastened in the state of FIG. 25(a). Specifically, the pair of fixed fastening parts 540 may be disposed on a surface of the connection plywood 31a and may be fastened to the first through-holes 552 provided in the connection plate 530 and the anchors 520.

20 [314] The pair of movable fastening parts 550 may be disposed on a surface of the fixed plywood 510 and may be fastened to the second through-holes 554 provided in the connection plate 530 and the anchors 520. The upper ends of the movable fastening parts 550 may be slidably movable within the sliding holes 556.

[315]

[316] FIG. 26 is a cross-sectional view for explaining a vertical portion of the liquefied gas storage tank according to the tenth embodiment of the present disclosure, and FIG. 27 is a graph for explaining effects of the liquefied gas storage tank according to FIG. 26.

[317] According to the tenth embodiment illustrated in FIG. 26, the liquefied gas storage tank 1 may comprise a barrier 100 forming an accommodation space for storing liquefied gas, a plurality of thermal insulation walls 200 provided on an outer side of the barrier 100, and insertion thermal insulation materials 220 inserted into gaps between adjacent thermal insulation walls 200.

[318] The plurality of thermal insulation walls 200 may have grooves 600 formed in side surfaces facing each other, and the grooves 600 may be provided in inner surfaces facing the barrier 100.

[319] The liquefied gas storage tank 1 may further comprise elastic finishing materials 610 provided in the grooves 600 and overlapping the insertion thermal insulation materials 220 in an inward-outward direction. The elastic finishing material 610 may be provided to be fitted into the groove 600 so as to contact an inner surface of the groove 600.

[320] The plurality of thermal insulation walls 200 may comprise primary plywoods 31 provided on surfaces facing the barrier 100, secondary plywoods 52 disposed on surfaces facing the support structure 300, and thermal insulation materials 210 disposed between the primary plywoods 31 and the secondary plywoods 52.

[321] The grooves 600 may be formed by surfaces defined by the primary plywoods 31 and the thermal insulation materials 210. Specifically, as illustrated in FIG. 26, when a surface facing the barrier 100 is viewed as an upper surface, the groove 600 may have a structure in which the upper surface is open, both side surfaces are surrounded by the primary plywood 31 and the thermal insulation material 210, and a lower surface is surrounded by the thermal

insulation material 210 and the insertion thermal insulation material 220.

[322] Examining the shape of the groove 600, a length e of one surface of the groove 600 protruding from a width of the insertion thermal insulation material 220 (that is, a length of a portion of the lower surface of the groove 600 protruding from the insertion thermal insulation material 220) may be greater than or equal to a length f of the other surface of the groove 600 parallel to the one surface of the groove 600 contacting the primary plywood 31.

[323] The liquefied gas storage tank 1 according to the tenth embodiment is characterized in that not only the insertion thermal insulation material 220 is disposed between the thermal insulation walls 200, but also the elastic finishing material 610 disposed to overlap the insertion thermal insulation material 220 adjacent to the barrier 100 is further comprised.

[324] In a conventional structure of the thermal insulation wall 200, glass wool 222 has been used as the insertion thermal insulation material 220.

[325] However, since the glass wool 222 is a non-homogeneous material, it has a thermal insulation effect by conduction but has a disadvantage in that a thermal insulation effect by convection is low. Due to this, there has been a problem in that icing occurs on one side of the thermal insulation wall 200.

[326] In order to solve the above problem, the liquefied gas storage tank 1 according to the present disclosure may further comprise the elastic finishing material 610 disposed to overlap the insertion thermal insulation material 220 constructed with the glass wool 222.

[327] The elastic finishing material 610 fitted into the groove 600 may comprise a low-temperature synthetic rubber material (EPDM; Ethylene-Propylene-Diene Rubber). The low-temperature synthetic rubber material (EPDM) is a synthetic rubber material having excellent usability and durability.

[328] In the case of the low-temperature synthetic rubber material (EPDM), a thermal

insulation effect by convection is also high, thereby providing effects of thermal insulation and blocking convection phenomena. In addition, since the low-temperature synthetic rubber material (EPDM) can be easily manufactured in various shapes, it is easy to manufacture the same according to the shape of the groove 600.

5 [329] FIG. 27 is a graph illustrating thermal conductivity of the low-temperature synthetic rubber material (EPDM).

[330] The graph corresponds to experimentally measured thermal conductivity values according to temperature using the low-temperature synthetic rubber material (EPDM) having a thickness of 2.86 cm (NETZSCH Analyzing & Testing).

10 [331] A horizontal axis represents temperature ($^{\circ}\text{C}$), and a vertical axis represents thermal conductivity (W/mK).

[332] The low-temperature synthetic rubber material (EPDM) has a characteristic of excellent compatibility even at low temperatures.

[333] From the graph illustrated in FIG. 27, it may be confirmed that a literature value and a
15 measurement result of the low-temperature synthetic rubber material (EPDM) are substantially identical. Accordingly, when the low-temperature synthetic rubber material (EPDM) is used, it can be seen that compatibility at low temperatures is actually high.

[334]

[335] FIG. 28 is a cross-sectional view illustrating a vulnerable structure occurring in a
20 vertical portion of a liquefied gas storage tank, and FIG. 29 is a cross-sectional view for explaining a vertical portion of the liquefied gas storage tank according to the eleventh embodiment of the present disclosure.

[336] First, FIG. 28 is a cross-sectional view illustrating a portion of the barrier 100 in which

corrugations 110 are formed in the structure of the vertical portion 121 of the liquefied gas storage tank.

[337] Referring to FIG. 28, illustrated are a barrier 100 having a structure in which corrugations 110 are formed and forming an accommodation space for storing liquefied gas, and a thermal insulation wall 200 disposed on an outer side of the barrier 100.

[338] The thermal insulation wall 200 may be provided with an insertion thermal insulation material 220 formed at a location corresponding to the corrugations 110 and a through-hole 640 formed at a location different from that of the insertion thermal insulation material 220 and filled with a thermal insulation plug 630 therein.

[339] The thermal insulation wall 200 may be fastened to the support structure 300 by stud bolts 660 fixed on the support structure 300 and may be supported by the support structure 300. The through-hole 640 may be disposed at a location corresponding to the stud bolts 660, and in this case, fastening holes 650 through which the stud bolts 660 pass may be formed in the secondary plywood 52 disposed to overlap the through-hole 640 of the thermal insulation wall 200.

[340] The barrier 100 forms an accommodation space for accommodating liquefied gas, which is a cryogenic material, and may be made of a metallic material, but the strength of the barrier 100 may vary depending on locations of the corrugations 110 formed in the barrier 100.

[341] That is, portions of the barrier 100 in which the corrugations 110 are formed have higher strength than portions of the barrier 100 in which the corrugations 110 are not formed. In particular, portions of the barrier 100 where the vertical corrugations 23 and the horizontal corrugations 24 intersect have the highest strength.

[342] If the through-hole 640 is provided in a portion of the barrier 100 in which the corrugations 110 are not formed, as illustrated in FIG. 28, deformation may be induced in the

barrier 100 and the thermal insulation wall 200 due to a load of the liquefied gas accommodated in the barrier 100. This is because the portion of the thermal insulation wall 200 in which the through-hole 640 is formed also has weak strength.

[343] According to the eleventh embodiment illustrated in FIG. 29, the liquefied gas storage tank 1 is intended to solve the deformation problem described with reference to FIG. 28.

[344] FIG. 29 differs from FIG. 28 only in the location of the through-hole 640, and since the other configurations are identical, duplicate descriptions thereof will be omitted.

[345] According to the eleventh embodiment illustrated in FIG. 29, the liquefied gas storage tank 1 may comprise a barrier 100 forming an accommodation space for storing liquefied gas and having lattice-shaped corrugations 110 protruding inward, and a thermal insulation wall 200 provided on an outer side of the barrier 100 and fixed to a support structure 300, wherein the thermal insulation wall 200 may have a structure in which at least a thermal insulation material 210 and plywoods 31 and 52 are stacked along an inward direction.

[346] The thermal insulation wall 200 may comprise a thermal insulation material 210, a primary plywood 31 provided on a surface of the thermal insulation material 210 facing the barrier 100, and a secondary plywood 52 provided on a surface of the thermal insulation material 210 facing the support structure 300.

[347] The thermal insulation wall 200 may be provided with a through-hole 640 formed at a location corresponding to a fixing member 620 provided on the support structure 300 and filled with a thermal insulation plug 630 therein.

[348] Although the fixing member 620 is illustrated as a stud bolt 660 by way of example, the present disclosure is not limited thereto. Other types of fixing members 620 may also be used by being fixed to the support structure 300 through welding, although their shapes and configurations may differ.

[349] The fixing members 620 may be installed on an inner surface of the support structure 300 by welding at appropriate intervals. As an example, the stud bolts 660 may be attached to the support structure 300 by stud welding, which is an automatic arc welding method.

[350] The liquefied gas storage tank 1 according to the eleventh embodiment is characterized by an arrangement relationship between the through-hole 640 provided in the thermal insulation wall 200 and the corrugations 110 of the barrier 100.

[351] Although not illustrated, the corrugations 110 illustrated in FIG. 29 refer to corrugations 110 at which the vertical corrugations 23 and the horizontal corrugations 24 intersect. Accordingly, the barrier 100 may be provided such that an intersection of the lattice-shaped corrugations 110 is located at a position overlapping the through-hole 640 along an inward-outward direction.

[352] That is, according to the eleventh embodiment, the through-hole 640 filled with the thermal insulation plug 630 is characterized in that the through-hole 640 is disposed to overlap a portion of the barrier 100 at which the lattice-shaped corrugations 110 intersect. In other words, the through-hole 640 is disposed at a portion of the barrier 100 having the highest strength.

[353] Referring to FIG. 29, a primary plywood 31 may be provided on an upper surface of the through-hole 640 facing the barrier 100, and a secondary plywood 52 disposed between the thermal insulation plug 630 and the support structure 300 may be provided on a lower surface of the through-hole 640.

[354] The secondary plywood 52 may be provided with a fastening hole 650 through which the fixing member 620 passes.

[355] The fixing member 620 may comprise a stud bolt 660 having one end fixed to the support structure 300 and the other end passing through the fastening hole 650 and being fixed

within the thermal insulation plug 630, a nut 662 fastened to the stud bolt 660, and an auxiliary plate 670 disposed between the nut 662 and the secondary plywood 52 to support the nut 662.

[356] The auxiliary plate 670 may have a size corresponding to the area of the lower surface of the through-hole 640. A peripheral area of the lower surface of the auxiliary plate 670 may be supported by the secondary plywood 52, and a central area of the upper surface of the auxiliary plate 670 may be supported by the nut 662.

[357] For a process of manufacturing the thermal insulation wall 200 provided with the through-hole 640 filled with the thermal insulation plug 630, reference may be made to FIG. 13 described above.

[358] In addition, the liquefied gas storage tank 1 may further comprise an accommodation part 680 provided within the thermal insulation plug 630 and configured to accommodate a portion of the fixing member 620. The accommodation part 680 may have a structure in which the thermal insulation plug 630 is not filled therein.

[359] As illustrated in FIG. 29, the structure of the thermal insulation wall 200 disposed on the barrier 100 in which the corrugations 110 are formed may have a structure in which the primary plywood 31, the thermal insulation plug 630 filled in the through-hole 640, the accommodation part 680, the fixing member 620 disposed in the accommodation part 680, the auxiliary plate 670 through which the fixing member 620 passes, and the secondary plywood 52 provided with the fastening hole 650 are sequentially stacked.

[360] As described above, according to the eleventh embodiment, since the through-hole 640 in which the fixing member 620 is disposed has lower strength than the thermal insulation wall 200 in which the through-hole 640 is not provided, there is an effect of securing the strength of the liquefied gas storage tank 1 by disposing the through-hole 640 to overlap the barrier 100 having high strength due to the intersecting corrugations 110 being formed therein.

[361]

[362] FIG. 30 is a rear view of a thermal insulation wall for explaining a vertical portion of the liquefied gas storage tank according to the twelfth embodiment of the present disclosure.

[363] The liquefied gas storage tank 1 according to the twelfth embodiment of the present disclosure may comprise a barrier 100 contacting liquefied gas and forming a storage space
5 accommodating the liquefied gas, a plurality of thermal insulation walls 200 installed on a support structure 300 and provided on an outer side of the barrier 100, a plurality of bonding strips 700 provided along a first direction on outer surfaces of the plurality of thermal insulation walls 200 fixed to the support structure 300, and a plurality of sealing strips 710 provided along
10 a second direction different from the first direction.

[364] The liquefied gas storage tank 1 according to the twelfth embodiment of the present disclosure may be a liquefied gas storage tank for onshore use comprising an outer tank 11 formed in a cylindrical shape and an inner tank 12 installed on an inner surface and a bottom of the outer tank 11.

[365] Here, the outer tank 11 may be a support structure 300 forming an outer appearance of the liquefied gas storage tank 1 by forming a cylindrical tank body having a substantially dome-shaped cover by pouring concrete or the like and having a cylindrical shape.

[366] In addition, as described above, the inner tank 12 may comprise a vertical portion 121 installed on an inner circumferential surface of the outer tank 11 and a bottom portion 122
20 installed on a bottom surface of the outer tank 11.

[367] The bottom portion 122 and the vertical portion 121 extending from the bottom portion 122 to a predetermined height may comprise a barrier 100, a primary thermal insulation wall 3 in which a primary plywood 31 and a primary thermal insulation material 32 are sequentially

stacked on an outer side of the barrier 100, a secondary barrier 4 installed on an outer side of the primary thermal insulation wall 3, and a secondary thermal insulation wall 5 in which a secondary thermal insulation material 51 and a secondary plywood 52 are sequentially stacked on an outer side of the secondary barrier 4.

5 [368] In addition, the vertical portion 121 positioned at a height greater than or equal to a predetermined height from the bottom portion 122 may comprise the barrier 100, the primary plywood 31 of the primary thermal insulation wall 3 provided on an outer side of the barrier 100, the thermal insulation material 210 provided on an outer side of the primary plywood 31, and the secondary plywood 52 of the secondary thermal insulation wall 5 provided on an outer
10 side of the thermal insulation material 210.

[369] Hereinafter, the plurality of bonding strips 700 and the plurality of sealing strips 710 according to the present embodiment will be described in detail.

[370] The plurality of bonding strips 700 may be formed along a longitudinal direction on an outer surface of each of the plurality of thermal insulation walls 200 and may be arranged
15 in plurality in a width direction.

[371] The plurality of thermal insulation walls 200 may be arranged at predetermined intervals in front, rear, left, and right directions. In this case, the plurality of sealing strips 710 may block thermal convection generated through spaces between the plurality of bonding strips 700 and spaces between the plurality of thermal insulation walls 200.

20 [372] The plurality of bonding strips 700 may be mastics 6, which are adhesive members.

[373] The plurality of sealing strips 710 may comprise first sealing strips 711 provided along a second direction on each of the plurality of thermal insulation walls 200, and second sealing strips 712 provided along the second direction between adjacent pairs of the plurality of thermal insulation walls 200.

[374] At least one first sealing strip 711 may be provided in a direction intersecting the plurality of bonding strips 700 and may block thermal convection generated through spaces between the plurality of bonding strips 700.

[375] The first sealing strips 711 may be provided along the width direction on the outer
5 surface of each of the plurality of thermal insulation walls 200, and at least one first sealing strips 711 may be arranged in the longitudinal direction.

[376] In addition, at least one second sealing strip 712 may be provided so as to traverse a space between an adjacent pair of thermal insulation walls 200 and may be provided so as to intersect at least one bonding strip 700 disposed at respective edges of the pair of thermal
10 insulation walls 200 among the plurality of bonding strips 700.

[377] The second sealing strip 712 may block thermal convection generated through the space between the pair of thermal insulation walls 200 and the spaces between the bonding strips 700 respectively provided at the edges of the pair of thermal insulation walls 200.

[378] The at least one second sealing strip 712 may be arranged to be offset from the first
15 sealing strip 711.

[379] When the plurality of bonding strips 700 are formed of mastics 6, which are adhesive members, the plurality of sealing strips 710 including the first sealing strips 711 and the second sealing strips 712 may be fixed to each of the plurality of thermal insulation walls 200 while intersecting at least one of the plurality of bonding strips 700. Of course, the plurality of sealing
20 strips 710 may be fixed to each of the plurality of thermal insulation walls 200 by other methods.

[380] The plurality of sealing strips 710 may be formed of at least one selected from the group consisting of glass wool, polyurethane, a synthetic block, and a cryogenic rubber material (EPDM).

[381] Here, the synthetic block may comprise a layer including reinforcing synthetic fibers impregnated with a synthetic resin.

[382] The synthetic resin may be a thermosetting resin, such as a phenolic resin, an unsaturated polyester resin, an epoxy resin, or a urethane resin.

5 [383] In this case, the layer may be formed of a composite material including glass fibers and a mixture of one or more organic binders selected from the group consisting of a phenolic resin, an unsaturated polyester resin, an epoxy resin, and a urethane resin, and may have a single-layer structure or a multilayer structure in which at least two layers are cross-laminated.

[384] The glass fibers may be reinforced glass fibers having high strength and a melting
10 point of 1,000°C or higher, and a content thereof may be 30% to 90% based on a total content of the composite material.

[385] The layer provided as described above may have a density of 800 kg/m³ to 3000 kg/m³.

[386] In addition, the layer may have a moisture content of 0.14% to 0.18%, a tensile strength of 248 MPa to 268 MPa, a flexural strength of 153 MPa to 163 MPa, a vertical compressive
15 strength of 180 MPa to 190 MPa, a horizontal compressive strength of 340 MPa to 360 MPa, a vertical shear strength of 60.9 MPa to 61.9 MPa, a horizontal shear strength of 54 MPa to 64 MPa, and a thermal conductivity of 0.1660 W/mK to 0.1668 W/mK.

[387] In addition, the liquefied gas storage tank 1 according to the twelfth embodiment of the present disclosure may further comprise an insertion thermal insulation material 220
20 inserted into a gap between the plurality of thermal insulation walls 200 and a connection thermal insulation material 32a overlapping the insertion thermal insulation material 220 along an inward-outward direction. Here, the insertion thermal insulation material 220 and the connection thermal insulation material 32a may correspond to the insertion thermal insulation material 220 and the connection thermal insulation material 32a according to the fifth, sixth,

and seventh embodiments described with reference to FIGS. 12, 15, and 17.

[388] The connection thermal insulation material 32a may be provided at a stepped portion formed in opposing portions of surfaces of the plurality of thermal insulation walls 200 facing the support structure 300 and may block thermal convection generated through a space between the plurality of thermal insulation walls 200 and the support structure 300. In this case, the second sealing strips 712 may be omitted because interference with the connection thermal insulation material 32a may occur.

[389] In addition, the liquefied gas storage tank 1 according to the twelfth embodiment of the present disclosure may further comprise an insertion thermal insulation material 220 inserted into a gap between the plurality of thermal insulation walls 200 and a connection thermal insulation material 32a overlapping the insertion thermal insulation material 220 along an inward-outward direction. Here, the insertion thermal insulation material 220 and the connection thermal insulation material 32a may correspond to the insertion thermal insulation material 220 and the connection thermal insulation material 32a according to the eighth and ninth embodiments described with reference to FIGS. 19 and 21.

[390] The connection thermal insulation material 32a may be provided at a stepped portion formed in opposing portions of surfaces of the plurality of thermal insulation walls 200 facing the barrier 100 and may block thermal convection in the inward-outward direction of the plurality of thermal insulation walls 200 through the insertion thermal insulation material 220.

[391] Accordingly, according to the present embodiment, by providing a plurality of bonding strips 700 along a first direction on outer surfaces of the plurality of thermal insulation walls 200 fixed to the support structure 300 and providing a plurality of sealing strips 710 along a second direction different from the first direction, thermal convection generated between the plurality of thermal insulation walls 200 and the support structure 300 may be effectively

blocked. In addition, by variously configuring the connection thermal insulation material 32a at opposing portions of surfaces of the plurality of thermal insulation walls 200, thermal convection generated through the space between the plurality of thermal insulation walls 200 and the support structure 300 and/or thermal convection in the inward-outward direction of the plurality of thermal insulation walls 200 through the insertion thermal insulation material 220 may be effectively blocked.

[392]

[393] FIGS. 31(a) and 31(b) are cross-sectional views for explaining a vertical portion of the liquefied gas storage tank according to the thirteenth embodiment of the present disclosure.

[394] The liquefied gas storage tank 1 according to the thirteenth embodiment of the present disclosure may comprise a barrier 100 contacting liquefied gas and forming a storage space accommodating the liquefied gas, a plurality of thermal insulation walls 200 installed on a support structure 300 and provided on an outer side of the barrier 100, an insertion thermal insulation material 220 inserted into a gap between the plurality of thermal insulation walls 200, a support strip 800 provided in a space SP between the support structure 300 and the plurality of thermal insulation walls 200 along a horizontal direction perpendicular to a gravity direction, and a sealing strip 810 provided above the support strip 800 and supported by the support strip 800 in the gravity direction.

[395] Such a liquefied gas storage tank 1 according to the thirteenth embodiment of the present disclosure may be a liquefied gas storage tank for onshore use comprising an outer tank 11 formed in a cylindrical shape and an inner tank 12 installed on an inner surface and a bottom of the outer tank 11.

[396] Here, the outer tank 11 may be a support structure 300 forming an outer appearance of the liquefied gas storage tank 1 by forming a cylindrical tank body having a substantially dome-

shaped cover by pouring concrete or the like and having a cylindrical shape.

[397] In addition, the inner tank 12 may comprise a vertical portion 121 installed on an inner circumferential surface of the outer tank 11 and a bottom portion 122 installed on a bottom surface of the outer tank 11.

5 [398] The bottom portion 122 and the vertical portion 121 extending from the bottom portion 122 to a predetermined height may comprise a barrier 100, a primary thermal insulation wall 3 in which a primary plywood 31 and a primary thermal insulation material 32 are sequentially stacked on an outer side of the barrier 100, a secondary barrier 4 installed on an outer side of the primary thermal insulation wall 3, and a secondary thermal insulation wall 5 in which a
10 secondary thermal insulation material 51 and a secondary plywood 52 are sequentially stacked on an outer side of the secondary barrier 4.

[399] In addition, the vertical portion 121 positioned at a height greater than or equal to a predetermined height from the bottom portion 122 may comprise the barrier 100, the primary plywood 31 of the primary thermal insulation wall 3 provided on an outer side of the barrier
15 100, the thermal insulation material 210 provided on an outer side of the primary plywood 31, and the secondary plywood 52 of the secondary thermal insulation wall 5 provided on an outer side of the thermal insulation material 210.

[400] Hereinafter, the support strip 800 and the sealing strip 810 according to the present embodiment will be described in detail.

20 [401] The support strip 800 may be formed in an annular shape such that one end thereof contacts the thermal insulation wall 200 disposed below the insertion thermal insulation material 220 and the other end thereof contacts the inner circumferential surface of the support structure 300.

[402] At this time, at least one of the one end and the other end of the support strip 800 may

be fixed to one of the thermal insulation wall 200 and the support structure 300.

[403] The support strip 800 may be installed on the inner circumferential surface of the support structure 300 before the plurality of thermal insulation walls 200 are installed on the support structure 300.

5 [404] In addition, the support strip 800 may be installed on one surface of the plurality of thermal insulation walls 200 when the plurality of thermal insulation walls 200 are manufactured.

[405] Such a support strip 800 may be formed of at least one selected from the group consisting of a member formed of concrete, a layer formed of glue, and a plate formed of wood.

10 [406] The sealing strip 810 may be formed to have a size having a width sufficient to cover at least the insertion thermal insulation material 220 and a thickness corresponding to a width of the space SP while a lower end thereof is supported by the support strip 800, and may block thermal convection generated through the space SP and thermal convection in the inward-outward direction of the plurality of thermal insulation walls 200 through the insertion thermal
15 insulation material 220.

[407] The sealing strip 810 may have a rectangular cross-sectional shape and may be inserted into and installed in the space SP.

[408] In addition, the sealing strip 810 may have a rectangular cross-sectional shape and may be temporarily installed on the inner circumferential surface of the support structure 300 using
20 an adhesive 820 before the plurality of thermal insulation walls 200 are installed on the support structure 300.

[409] As illustrated in FIG. 31(b), the sealing strip 810 may basically have a rectangular cross-sectional shape, and as illustrated in FIG. 31(a), a groove may be formed on a surface thereof contacting the support structure 300.

[410] The sealing strip 810 may be formed of at least one selected from the group consisting of glass wool, polyurethane, a synthetic block, and a cryogenic rubber material (EPDM).

[411] Here, the synthetic block may comprise a layer including reinforcing synthetic fibers impregnated with a synthetic resin, and since the synthetic block is identical or similar to the synthetic block described in the twelfth embodiment, a detailed description thereof will be omitted herein to avoid redundant explanation.

[412] Accordingly, according to the present embodiment, by providing the support strip 800 in the space SP between the support structure 300 and the plurality of thermal insulation walls 200 along a horizontal direction perpendicular to a gravity direction and providing the sealing strip 810 above the support strip 800 such that the sealing strip 810 is supported by the support strip 800 in the gravity direction, the sealing strip 810 for blocking thermal convection may eliminate a risk of detachment between the support structure 300 and the plurality of thermal insulation walls 200 by being supported by the support strip 800. Accordingly, thermal convection generated through the space SP between the plurality of thermal insulation walls 200 and the support structure 300 and/or thermal convection in the inward-outward direction of the plurality of thermal insulation walls 200 through the insertion thermal insulation material 220 may be effectively blocked.

[413] FIG. 32 is a partial perspective view for explaining a lower barrier finishing part in the liquefied gas storage tank according to the fourteenth embodiment of the present disclosure. FIG. 33 is an enlarged view of portion A of FIG. 32 for explaining the lower barrier finishing part in the liquefied gas storage tank according to the fourteenth embodiment of the present disclosure. FIGS. 34(a) to 34(c) are views for explaining an installation process of the lower barrier finishing part in the liquefied gas storage tank according to the fourteenth embodiment of the present disclosure.

[414] Referring to FIGS. 32 to 34, the liquefied gas storage tank 1 according to the fourteenth embodiment of the present disclosure may comprise a primary barrier 2 contacting liquefied gas and forming a storage space for the liquefied gas, at least one thermal insulation wall installed on a support structure and provided on an outer side of the primary barrier 2, a
5 secondary barrier 4 installed between thermal insulation walls and extending from a bottom of the storage space to a predetermined height, and a lower barrier finishing part 100 configured to fix the secondary barrier 4 to the support structure.

[415] Here, the support structure may be the outer tank 11 of the liquefied gas storage tank 1 described above.

10 [416] In addition, in the liquefied gas storage tank 1 described above, the thermal insulation wall may be a multilayer thermal insulation wall comprising the primary thermal insulation wall 3 in which the primary plywood 31 and the primary thermal insulation material 32 are sequentially stacked on an outer side of the primary barrier 2, and the secondary thermal
15 insulation wall 5 in which the secondary thermal insulation material 51 and the secondary plywood 52 are sequentially stacked on an outer side of the secondary barrier 4 installed on an outer side of the primary thermal insulation wall 3.

[417] Such a liquefied gas storage tank 1 according to the fourteenth embodiment of the present disclosure may be a liquefied gas storage tank for onshore use comprising an outer tank 11 formed in a cylindrical shape and an inner tank 12 installed on an inner surface and a bottom
20 of the outer tank 11.

[418] Here, the outer tank 11 may have a cylindrical shape and may be a support structure forming an outer appearance of the liquefied gas storage tank 1 by pouring concrete and the like to form a cylindrical tank body having a substantially dome-shaped cover.

[419] In addition, as described above, the inner tank 12 may comprise a vertical portion 121

installed on an inner circumferential surface of the outer tank 11 and a bottom portion 122 installed on a bottom surface of the outer tank 11.

[420] In addition, the inner tank 12 may comprise a lower barrier finishing part 100 installed on the vertical portion 121 at a predetermined height from the bottom portion 122 and
5 configured to fix the secondary barrier 4 to the outer tank 11, and an upper barrier finishing part installed on an upper end of the vertical portion 121 and configured to fix the primary barrier 2 to the outer tank 11.

[421] The lower barrier finishing part 100 will be described later.

[422] In addition, the upper barrier finishing part may be configured as the upper barrier
10 finishing part 300 according to the sixteenth embodiment to be described later with reference to FIG. 36, but is not limited thereto and may be configured in various ways.

[423] The vertical portion 121 and the bottom portion 122 located below the lower barrier finishing part 100 may comprise the primary barrier 2, the primary thermal insulation wall 3 in which the primary plywood 31 and the primary thermal insulation material 32 are sequentially
15 stacked on an outer side of the primary barrier 2, the secondary barrier 4 installed on an outer side of the primary thermal insulation wall 3, and the secondary thermal insulation wall 5 in which the secondary thermal insulation material 51 and the secondary plywood 52 are sequentially stacked on an outer side of the secondary barrier 4.

[424] In addition, the vertical portion 121 located between the lower barrier finishing part
20 100 and the upper barrier finishing part may comprise the primary barrier 2, the primary plywood 31 of the primary thermal insulation wall 3 provided on an outer side of the primary barrier 2, a thermal insulation material comprising either the primary thermal insulation material 32 of the primary thermal insulation wall 3 or the secondary thermal insulation material 51 of the secondary thermal insulation wall 5 provided on an outer side of the primary

plywood 31, and the secondary plywood 52 of the secondary thermal insulation wall 5 provided on an outer side of the thermal insulation material.

[425] Hereinafter, the lower barrier finishing part 100 according to the present disclosure will be described in detail.

5 [426] The lower barrier finishing part 100 fixes the secondary barrier 4 to the support structure and may comprise an embedded plate 110, a protruding plate 120, a step-buffering means 130, and a sealing plate 140.

[427] The embedded plate 110 may be embedded and installed along an inner circumferential surface of the support structure at a predetermined height from a bottom of the liquefied gas
10 storage tank 1.

[428] The embedded plate 110 may be formed of a metallic material and may allow the secondary barrier 4 to be fixed to the support structure through the protruding plate 120, the step-buffering means 130, and the sealing plate 140.

[429] The protruding plate 120 may protrude inward from the embedded plate 110.

15 [430] The protruding plate 120 may be formed of a metallic material and may be fixed to the embedded plate 110 by welding or the like.

[431] The protruding plate 120 may extend inward from the embedded plate 110, but may extend so as not to exceed at least the secondary barrier 4.

[432] The step-buffering means 130 may be formed of a metallic material and may be
20 configured to alleviate an inward-outward step difference between the protruding plate 120 and the secondary barrier 4.

[433] The step-buffering means 130 may be formed in a "U" shape including an upper horizontal plate, a vertical plate connected to the upper horizontal plate, and a lower horizontal

plate connected to the vertical plate and parallel to the upper horizontal plate.

[434] Corner portions between the upper horizontal plate and the vertical plate and between the lower horizontal plate and the vertical plate may be formed in a curved shape. As described above, the corner portions are formed in a curved shape because, when the corner portions are angular, the sealing plate 140 formed of a composite material may be damaged at the corner portions during or after installation of the sealing plate 140.

[435] The step-buffering means 130 may be installed such that the upper horizontal plate is brought into contact with the upper surface of the protruding plate 120 and slid forward and backward until the vertical plate is aligned with the secondary barrier 4, after which an end of the upper horizontal plate may be fixed to the upper surface of the protruding plate 120 by welding or the like, thereby alleviating the inward-outward step difference between the protruding plate 120 and the secondary barrier 4.

[436] In addition, the step-buffering means 130 may be installed to support the sealing plate 140 in a space between the protruding plate 120 and the secondary barrier 4, thereby preventing wrinkling of the sealing plate 140. That is, since the sealing plate 140 is formed of a composite material, wrinkles may occur in the space between the protruding plate 120 and the secondary barrier 4, and thus it is preferable to fill the space with the step-buffering means 130.

[437] The sealing plate 140 may be formed of a composite material.

[438] The sealing plate 140 may be formed of various multilayer materials having a structure in which a first member/aluminum foil (AF)/second member are stacked. At this time, at least one of the first member and the second member may be glass cloth (GC), glass-aramid cloth (GAC), basalt cloth (BC), or glass cloth (GC)/aluminum foil (AF)/glass cloth (GC). Here, the glass-aramid cloth (GAC) is obtained by applying an aramid material to glass cloth and may be manufactured by mixing one strand of aramid for every two strands of glass fiber.

[439] For example, the sealing plate 140 according to the present disclosure may be formed of a first material having a three-layer structure in which glass cloth (GC), aluminum foil (AF), and glass-aramid cloth (GAC) are stacked.

[440] In addition, the sealing plate 140 may be formed of a second material having a five-
5 layer structure in which glass cloth (GC), aluminum foil (AF), glass cloth (GC), aluminum foil (AF), and glass cloth (GC) are stacked.

[441] In addition, the sealing plate 140 may be formed of a third material having a three-layer structure in which basalt cloth (BC), aluminum foil (AF), and basalt cloth (BC) are stacked.

10 [442] The sealing plate 140 may contact an outer surface of the step-buffering means 130 and may sealingly connect the protruding plate 120 and the secondary barrier 4.

[443] The sealing plate 140 may have an L-shaped bent form in which an upper portion is connected to the protruding plate 120 and a lower portion is connected to the secondary barrier 4.

15 [444] A horizontal upper portion of the sealing plate 140 may be bonded to the upper horizontal plate of the step-buffering means 130 by an adhesive 150.

[445] A vertical lower portion of the sealing plate 140 may not be bonded to the vertical plate of the step-buffering means 130, but may be bonded to the secondary barrier 4 by the adhesive 150.

20 [446] The sealing plate 140 may prevent liquefied gas from leaking to the outside together with the secondary barrier 4.

[447] With reference to FIGS. 34(a) to 34(c), a process of installing the lower barrier finishing part 100 in the liquefied gas storage tank 1 according to the fourteenth embodiment

of the present disclosure will be described.

[448] First, as illustrated in FIG. 34(a), the embedded plate 110 is installed in the outer tank 11, the secondary thermal insulation wall 5 and the secondary barrier 4 are formed below the lower barrier finishing part 100, and the protruding plate 120 protruding inward from the embedded plate 110 is fixed by welding or the like at a position spaced apart from the secondary thermal insulation wall 5 by a predetermined distance.

[449] As illustrated in FIG. 34(b), the step-buffering means 130 is installed. The step-buffering means 130 may be installed by sliding the upper horizontal plate forward and backward while maintaining contact with the upper surface of the protruding plate 120 until the vertical plate is aligned with the secondary barrier 4, and then fixing an end of the upper horizontal plate to the upper surface of the protruding plate 120 by welding or the like. Accordingly, the inward-outward step difference between the protruding plate 120 and the secondary barrier 4 may be alleviated, while wrinkles in the sealing plate 140 may be prevented from occurring in a space between the protruding plate 120 and the secondary barrier 4.

[450] As illustrated in FIG. 34(c), the sealing plate 140 is installed so as to contact the outer surface of the step-buffering means 130 and sealingly connect the protruding plate 120 and the secondary barrier 4. The sealing plate 140 is installed such that a horizontal upper portion thereof is bonded to the upper horizontal plate of the step-buffering means 130 by an adhesive 150, and a vertical lower portion thereof is not bonded to the vertical plate of the step-buffering means 130 but is bonded to the secondary barrier 4 by the adhesive 150.

[451] Accordingly, the lower barrier finishing part 100 according to the fourteenth embodiment is configured such that the secondary barrier 4 is not directly connected to the embedded plate 110, the protruding plate 120, and the step-buffering means 130, which are formed of metallic materials, but is indirectly connected thereto through the sealing plate 140

formed of a composite material. Therefore, a problem in which excessive stress is generated due to vulnerability to thermal behavior when directly connected by metallic materials may be resolved, thereby reducing thermal stress and heat loss.

[452]

5 [453] FIG. 35 is a cross-sectional view for explaining a lower barrier finishing part in a liquefied gas storage tank according to a fifteenth embodiment of the present disclosure.

[454] Referring to FIG. 35, the liquefied gas storage tank 1 according to the fifteenth embodiment of the present disclosure may comprise a primary barrier 2 contacting liquefied gas and forming a storage space for the liquefied gas, at least one thermal insulation wall
10 installed on a support structure and provided on an outer side of the primary barrier 2, a secondary barrier 4 installed between thermal insulation walls and provided up to a predetermined height from a bottom of the storage space, and a lower barrier finishing part 200 configured to fix the secondary barrier 4 to the support structure.

[455] Here, the support structure may be the outer tank 11 of the liquefied gas storage tank
15 1 described above.

[456] In addition, in the above-described liquefied gas storage tank 1, the thermal insulation wall may be a multilayer thermal insulation wall including the primary thermal insulation wall 3 in which the primary plywood 31 and the primary thermal insulation material 32 are sequentially stacked on an outer side of the primary barrier 2, and the secondary thermal
20 insulation wall 5 in which the secondary thermal insulation material 51 and the secondary plywood 52 are sequentially stacked on an outer side of the secondary barrier 4 installed on an outer side of the primary thermal insulation wall 3.

[457] Such a liquefied gas storage tank 1 according to the fifteenth embodiment of the present disclosure may be a liquefied gas storage tank for onshore use comprising an outer tank

11 formed in a cylindrical shape and an inner tank 12 installed on an inner surface and a bottom of the outer tank 11.

[458] Here, the outer tank 11 may have a cylindrical shape and may be a support structure forming an outer appearance of the liquefied gas storage tank 1 by pouring concrete or the like to form a cylindrical tank body having a substantially dome-shaped cover.

[459] In addition, as described above, the inner tank 12 may comprise a vertical portion 121 installed on an inner circumferential surface of the outer tank 11 and a bottom portion 122 installed on a bottom surface of the outer tank 11.

[460] In addition, the inner tank 12 may comprise a lower barrier finishing part 200 installed on the vertical portion 121 at a predetermined height from the bottom portion 122 and configured to fix the secondary barrier 4 to the outer tank 11, and an upper barrier finishing part installed on an upper end of the vertical portion 121 and configured to fix the primary barrier 2 to the outer tank 11.

[461] The lower barrier finishing part 200 will be described later.

[462] In addition, the upper barrier finishing part may be configured as the upper barrier finishing part 300 according to the sixteenth embodiment to be described later with reference to FIG. 36, but is not limited thereto and may be configured in various ways.

[463] The vertical portion 121 and the bottom portion 122 located below the lower barrier finishing part 200 may comprise the primary barrier 2, the primary thermal insulation wall 3 in which the primary plywood 31 and the primary thermal insulation material 32 are sequentially stacked on an outer side of the primary barrier 2, the secondary barrier 4 installed on an outer side of the primary thermal insulation wall 3, and the secondary thermal insulation wall 5 in which the secondary thermal insulation material 51 and the secondary plywood 52 are sequentially stacked on an outer side of the secondary barrier 4.

[464] In addition, the vertical portion 121 located between the lower barrier finishing part 200 and the upper barrier finishing part may comprise the primary barrier 2, the primary plywood 31 of the primary thermal insulation wall 3 provided on an outer side of the primary barrier 2, a thermal insulation material comprising either the primary thermal insulation material 32 of the primary thermal insulation wall 3 or the secondary thermal insulation material 51 of the secondary thermal insulation wall 5 provided on an outer side of the primary plywood 31, and the secondary plywood 52 of the secondary thermal insulation wall 5 provided on an outer side of the thermal insulation material.

[465] Hereinafter, the lower barrier finishing part 200 according to the present disclosure will be described in detail.

[466] The lower barrier finishing part 200 fixes the secondary barrier 4 to the support structure and may comprise an embedded plate 210, a protruding plate 220, a sealing plate 230, a block member 240, and a panel joint 250.

[467] The embedded plate 210 may be embedded and installed along an inner circumferential surface of the support structure at a predetermined height from a bottom of the liquefied gas storage tank 1.

[468] The embedded plate 210 may be formed of a metallic material and may allow the secondary barrier 4 to be fixed to the support structure through the protruding plate 220 and the sealing plate 230.

[469] The protruding plate 220 may protrude inward from the embedded plate 210.

[470] The protruding plate 220 may be formed of a metallic material and may be fixed to the embedded plate 210 by welding or the like.

[471] The protruding plate 220 may extend inward from the embedded plate 210, but may

extend so as not to exceed at least the secondary barrier 4.

[472] The protruding plate 220 may be bonded to an upper end of a thermal insulation wall installed below the lower barrier finishing part 200 by a mastic 6. Here, the thermal insulation wall may be the secondary thermal insulation wall 5.

5 [473] The sealing plate 230 may be formed of a composite material.

[474] The sealing plate 230 may be formed of various multilayer materials having a structure in which a first member/aluminum foil (AF)/second member are stacked. At this time, at least one of the first member and the second member may be glass cloth (GC), glass-aramid cloth (GAC), basalt cloth (BC), or glass cloth (GC)/aluminum foil (AF)/glass cloth (GC). Here, the
10 glass-aramid cloth (GAC) is obtained by applying an aramid material to glass cloth and may be manufactured by mixing one strand of aramid for every two strands of glass fiber.

[475] For example, the sealing plate 230 according to the present disclosure may be formed of a first material having a three-layer structure in which glass cloth (GC), aluminum foil (AF), and glass-aramid cloth (GAC) are stacked.

15 [476] In addition, the sealing plate 230 may be formed of a second material having a five-layer structure in which glass cloth (GC), aluminum foil (AF), glass cloth (GC), aluminum foil (AF), and glass cloth (GC) are stacked.

[477] In addition, the sealing plate 230 may be formed of a third material having a three-layer structure in which basalt cloth (BC), aluminum foil (AF), and basalt cloth (BC) are
20 stacked.

[478] The sealing plate 230 may contact an outer surface of the block member 240 and may sealingly connect the protruding plate 120 and the secondary barrier 4.

[479] The sealing plate 230 may have an L-shaped bent form in which an upper portion is

connected to the protruding plate 220 and a lower portion is connected to the secondary barrier 4.

[480] A horizontal upper portion of the sealing plate 230 may be bonded to an upper surface of the protruding plate 220 by an adhesive 260.

5 [481] A vertical lower portion of the sealing plate 230 may be bonded to the secondary barrier 4 by the adhesive 260, while horizontal and vertical portions thereof contacting the outer surface of the block member 240 may not be bonded.

[482] The sealing plate 230 may prevent liquefied gas from leaking to the outside together with the secondary barrier 4.

10 [483] The block member 240 may be provided between a lower surface of the sealing plate 230 and an upper end of the thermal insulation wall. Here, the thermal insulation wall may be the secondary thermal insulation wall 5.

[484] The block member 240 may have a size extending from an end of the protruding plate 220 to the secondary barrier 4 while contacting the end of the protruding plate 220, and a corner
15 portion at a point where the sealing plate 230 is bent may have a curved shape.

[485] The block member 240 may be installed to support the sealing plate 230 in a space between the protruding plate 220 and the secondary barrier 4, thereby preventing wrinkling of the sealing plate 230. That is, since the sealing plate 230 is formed of a composite material, wrinkles may occur in the space between the protruding plate 220 and the secondary barrier 4,
20 and thus it is preferable to fill the space with the block member 240.

[486] The block member 240 may be formed of a wood block or a synthetic block.

[487] Here, the synthetic block may comprise a layer impregnated with reinforced synthetic fibers in a synthetic resin.

[488] The synthetic resin may be a thermosetting resin, such as a phenol resin, an unsaturated polyester resin, an epoxy resin, or a urethane resin.

[489] In this case, the layer may be formed of a composite material comprising glass fibers and a mixture of at least one organic binder selected from phenol resin, unsaturated polyester resin, epoxy resin, and urethane resin, and may have a single-layer structure or a multilayer structure in which at least two layers are cross-laminated.

[490] Here, the glass fibers may be reinforced glass fibers having high strength and a melting point of 1,000°C or higher, and may be contained in an amount of 30% to 90% based on a total content of the composite material.

10 [491] The layer thus provided may have a density of 800 kg/m³ to 3000 kg/m³.

[492] In addition, the layer may have a moisture content of 0.14% to 0.18%, a tensile strength of 248 MPa to 268 MPa, a flexural strength of 153 MPa to 163 MPa, a vertical compressive strength of 180 MPa to 190 MPa, a horizontal compressive strength of 340 MPa to 360 MPa, a vertical shear strength of 60.9 MPa to 61.9 MPa, a horizontal shear strength of 54 MPa to 64 MPa, and a thermal conductivity of 0.1660 W/mK to 0.1668 W/mK.

[493] The panel joint 250 may be formed of a thermal insulation material such as glass wool and may be inserted into and installed in a space between a thermal insulation wall installed below the lower barrier finishing part 200 and a thermal insulation wall installed above the lower barrier finishing part 200.

20 [494] Here, the thermal insulation wall installed below the lower barrier finishing part 200 may be a multilayer thermal insulation wall including the primary thermal insulation wall 3 in which the primary plywood 31 and the primary thermal insulation material 32 are sequentially stacked on an outer side of the primary barrier 2, and the secondary thermal insulation wall 5 in which the secondary thermal insulation material 51 and the secondary plywood 52 are

sequentially stacked on an outer side of the secondary barrier 4 installed on an outer side of the primary thermal insulation wall 3.

[495] In addition, the thermal insulation wall installed above the lower barrier finishing part 200 may be a single-layer thermal insulation wall comprising the primary plywood 31 of the primary thermal insulation wall 3 provided on an outer side of the primary barrier 2, a thermal insulation material comprising either the primary thermal insulation material 32 of the primary thermal insulation wall 3 provided on an outer side of the primary plywood 31 or the secondary thermal insulation material 51 of the secondary thermal insulation wall 5, and the secondary plywood 52 of the secondary thermal insulation wall 5 provided on an outer side of the thermal insulation material.

[496] Accordingly, the lower barrier finishing part 200 according to the fifteenth embodiment may be configured such that the secondary barrier 4 is not directly connected to the embedded plate 210 and the protruding plate 220 formed of a metallic material, but is indirectly connected thereto through the sealing plate 230 formed of a composite material, thereby solving a problem in which excessive stress is generated due to vulnerability to thermal behavior when directly connected to a metallic material, and reducing thermal stress and heat loss.

[497]

[498] FIG. 36 is a cross-sectional view for explaining an upper barrier finishing part in a liquefied gas storage tank according to a sixteenth embodiment of the present disclosure.

[499] Referring to FIG. 36, the liquefied gas storage tank 1 according to the sixteenth embodiment of the present disclosure may comprise a primary barrier 2 that is in contact with liquefied gas and forms a storage space for the liquefied gas, a thermal insulation wall installed on a support structure and provided on an outer side of the primary barrier 2, and an upper

barrier finishing part 300 configured to fix the primary barrier 2 to the support structure.

[500] In the above, the support structure may be the outer tank 11 of the above-described liquefied gas storage tank 1.

[501] In addition, in the above-described liquefied gas storage tank 1, the thermal insulation
5 wall may be a single-layer thermal insulation wall comprising the primary plywood 31 of the primary thermal insulation wall 3 provided on an outer side of the primary barrier 2, a thermal insulation material comprising either the primary thermal insulation material 32 of the primary thermal insulation wall 3 provided on an outer side of the primary plywood 31 or the secondary thermal insulation material 51 of the secondary thermal insulation wall 5, and the secondary
10 plywood 52 of the secondary thermal insulation wall 5 provided on an outer side of the thermal insulation material, and hereinafter, for convenience of description, may be referred to as the thermal insulation wall 3, 5.

[502] The liquefied gas storage tank 1 according to the sixteenth embodiment of the present disclosure may be a liquefied gas storage tank for onshore use comprising an outer tank 11
15 formed in a cylindrical shape and an inner tank 12 installed on an inner surface and a bottom surface of the outer tank 11.

[503] In the above, the outer tank 11 may have a cylindrical shape and may be a support structure forming an outer appearance of the liquefied gas storage tank 1 by pouring concrete or the like to form a cylindrical tank body having a substantially dome-shaped cover.

[504] In addition, the inner tank 12 may comprise, as described above, a vertical portion 121
20 installed on an inner circumferential surface of the outer tank 11 and a bottom portion 122 installed on a bottom surface of the outer tank 11.

[505] In addition, the inner tank 12 may comprise a lower barrier finishing part configured to fix the secondary barrier 4 to the outer tank 11 and installed at a vertical portion 121 located

at a predetermined height from the bottom portion 122, and an upper barrier finishing part 300 installed at an upper end of the vertical portion 121 and configured to fix the primary barrier 2 to the outer tank 11.

[506] In the above, the lower barrier finishing part may be configured as the lower barrier finishing part 100 of the fourteenth embodiment described above with reference to FIG. 33 or the lower barrier finishing part 200 of the fifteenth embodiment described above with reference to FIG. 35, but is not limited thereto and may be configured in various ways.

[507] In addition, the upper barrier finishing part 300 will be described later.

[508] In the above, the vertical portion 121 and the bottom portion 122 located below the lower barrier finishing part may comprise the primary barrier 2, the primary thermal insulation wall 3 in which the primary plywood 31 and the primary thermal insulation material 32 are sequentially stacked on an outer side of the primary barrier 2, the secondary barrier 4 installed on an outer side of the primary thermal insulation wall 3, and the secondary thermal insulation wall 5 in which the secondary thermal insulation material 51 and the secondary plywood 52 are sequentially stacked on an outer side of the secondary barrier 4.

[509] In addition, the vertical portion 121 located between the lower barrier finishing part and the upper barrier finishing part 300 may comprise the primary barrier 2, the primary plywood 31 of the primary thermal insulation wall 3 provided on an outer side of the primary barrier 2, a thermal insulation material comprising either the primary thermal insulation material 32 of the primary thermal insulation wall 3 provided on an outer side of the primary plywood 31 or the secondary thermal insulation material 51 of the secondary thermal insulation wall 5, and the secondary plywood 52 of the secondary thermal insulation wall 5 provided on an outer side of the thermal insulation material.

[510] Hereinafter, the upper barrier finishing part 300 according to the present disclosure

will be described in detail.

[511] The upper barrier finishing part 300 fixes the primary barrier 2 to the support structure and may comprise an embedded plate 310, a protruding plate 320, a sealing plate 330, a closing block 340, and a panel joint 350.

5 [512] The embedded plate 310 may be embedded and installed along an inner circumferential surface of the support structure at an upper portion of the support structure.

[513] The embedded plate 310 may be formed of a metallic material and may allow the primary barrier 2 to be fixed to the support structure through the protruding plate 320 and the sealing plate 330.

10 [514] The protruding plate 320 may protrude inward from the embedded plate 310.

[515] The protruding plate 320 may be formed of a metallic material and may be fixed to the embedded plate 310 by welding or the like.

[516] The protruding plate 320 may extend inward from the embedded plate 310, but may extend so as not to extend beyond at least the primary barrier 2.

15 [517] The sealing plate 330 may be formed of a metallic material.

[518] The sealing plate 330 may have an L-shaped bent form and may seal and connect the protruding plate 320 and the primary barrier 2.

[519] The sealing plate 330 may be fixed to the protruding plate 320 by welding or the like after a vertical plate thereof is positioned in line with an inner surface of the thermal insulation
20 wall 3, 5 while a horizontal plate thereof is slid forward and backward with the horizontal plate in contact with a lower surface of the protruding plate 320. The vertical plate of the sealing plate 330 may be fixed to the primary barrier 2 by welding or the like.

[520] The sealing plate 330 may prevent liquefied gas from leaking to the outside together

with the primary barrier 2.

[521] The closing block 340 may be provided between the thermal insulation wall 3, 5 and the protruding plate 320 and between the thermal insulation wall 3, 5 and the sealing plate 330.

[522] The closing block 340 may comprise a first closing block 341 provided between the
5 thermal insulation wall 3, 5 and the protruding plate 320 and a second closing block 342 provided between the thermal insulation wall 3, 5 and the sealing plate 330.

[523] The first closing block 341 and the second closing block 342 may be formed integrally or separately.

[524] The first closing block 341 and the second closing block 342 may be arranged such
10 that a lower surface of the first closing block 341 and a lower surface of the second closing block 342 are positioned on the same line. The upper surface of the first closing block 341 may be arranged to be positioned on the same line as the upper surface of the sealing plate 330.

[525] The second closing block 342 may be fixedly coupled to the sealing plate 330 by a riveting method or a stud method.

[526] In this case, the sealing plate 330 may be fixed to the protruding plate 320 by welding
15 or the like in a state in which the second closing block 342 is fixedly coupled to an inner surface thereof in advance.

[527] The first closing block 341 and the second closing block 342 may be formed of the same material or different materials and may be formed of at least one of a wood block, a
20 synthetic block, and reinforced polyurethane foam.

[528] In the above, the synthetic block may comprise a layer impregnated with reinforced synthetic fibers in a synthetic resin.

[529] In the above, the synthetic resin may be a thermosetting resin, such as a phenolic resin,

an unsaturated polyester resin, an epoxy resin, or a urethane resin.

[530] In this case, the layer may be formed of a composite material comprising glass fibers and a mixture of at least one organic binder selected from the group consisting of a phenolic resin, an unsaturated polyester resin, an epoxy resin, and a urethane resin, and may have a
5 single-layer structure or a multilayer structure in which at least two layers are cross-stacked.

[531] In the above, the glass fibers may be reinforced glass fibers having high strength and a melting point of 1,000°C or higher, and a content thereof may be 30% to 90% based on a total content of the composite material.

[532] The layer thus provided may have a density of 800 kg/m³ to 3000 kg/m³.

10 [533] In addition, the layer may have a moisture content of 0.14% to 0.18%, a tensile strength of 248 MPa to 268 MPa, a flexural strength of 153 MPa to 163 MPa, a vertical compressive strength of 180 MPa to 190 MPa, a horizontal compressive strength of 340 MPa to 360 MPa, a vertical shear strength of 60.9 MPa to 61.9 MPa, a horizontal shear strength of 54 MPa to 64 MPa, and a thermal conductivity of 0.1660 W/mK to 0.1668 W/mK.

15 [534] Panel joint 350 may be formed of a thermal insulation material such as glass wool and may be inserted into and installed in a tolerance section formed between the thermal insulation wall 3, 5 and the closing block 340.

[535] Accordingly, in the lower barrier finishing part 300 according to the sixteenth embodiment, the tolerance section into which the panel joint 350 is inserted may be small and
20 may be easily managed, thereby improving weldability and workability, and thermal insulation performance may be enhanced due to a reduction in the area to which glass wool is applied.

[536] In addition, the lower barrier finishing part 300 according to the sixteenth embodiment may be configured such that the closing block 340 is fixedly coupled to an inner surface of the sealing plate 330 in advance, thereby relatively reducing the amount of on-board work.

[537]

[538]

[539] A corner structure is applied to a peripheral portion of the bottom portion of the liquefied gas storage tank 1. The corner structure will be described with reference to FIGS. 37
5 to 39.

[540] FIG. 37 is a partially exploded perspective view of a corner structure of a liquefied gas storage tank according to a seventeenth embodiment of the present disclosure, FIG. 38 is a front view of the corner structure of the liquefied gas storage tank according to the seventeenth embodiment of the present disclosure, and FIG. 39 is a cross-sectional view of the corner
10 structure of the liquefied gas storage tank according to the seventeenth embodiment of the present disclosure.

[541] Referring to FIGS. 37 to 39, the corner structure of the liquefied gas storage tank 1 may be composed of a combination of a plurality of corner blocks CB. A plurality of flat blocks may be connected to the plurality of corner blocks CB at corner portions of the liquefied gas
15 storage tank 1.

[542] Each corner block CB may comprise a lower block LB fixed to a wall or the outer tank 11, an upper block UUB bonded onto the lower block LB and having a width smaller than front-rear and left-right widths of the lower block LB, and an upper connection block UBB provided between adjacent upper blocks UUB.

[543] The lower block LB may comprise a corner secondary thermal insulation wall 5b configured to comprise a corner secondary barrier 41b bonded to a lower surface of the upper block UUB, a corner connection barrier 42b configured to connect adjacent corner secondary barriers 41b when the lower blocks LB are disposed adjacent to each other and bonded to a
20

lower surface of the upper connection block UBB, an inner secondary plywood 51b, a corner secondary thermal insulation material 52b, and an outer secondary plywood 54b, wherein the upper block UUB and the upper connection block UBB may be installed on an upper surface thereof.

5 [544] The corner secondary thermal insulation wall 5b may comprise an outer first fixing part 5b1 and an outer second fixing part 5b2 respectively fixed to inner sides of a first surface and a second surface and configured in a structure in which the inner secondary plywood 51b, the corner secondary thermal insulation material 52b, and the outer secondary plywood 54b are sequentially stacked. The outer first fixing part 5b1 may be fixed to the inner side of the first
10 surface, and the outer second fixing part 5b2 may be fixed to the inner side of the second surface.

[545] The upper block UUB may comprise a single board bonded on the lower block LB and having a width narrower than the front, rear, left, and right widths of the lower block LB. In the upper block UUB, a plurality of unit upper blocks UB1, UB2, UB3, and UB4 may be disposed adjacent to and parallel with each other.

15 [546] The upper block UUB may be provided with a barrier fixing member 21b formed such that a plurality of unit barrier fixing members 21b1, 21b2, 21b3, and 21b4 are independently disposed adjacent to and parallel with each other at portions corresponding to the plurality of unit upper blocks UB1, UB2, UB3, and UB4, respectively.

[547] The upper block UUB may comprise a corner primary thermal insulation wall 3b
20 including an inner first fixing part 3b1 and an inner second fixing part 3b2, in each of which an inner primary plywood 31b, a corner primary thermal insulation material 32b, and an outer primary plywood 33b are sequentially stacked on an outer side of the barrier fixing member 21b. The inner first fixing part 3b1 and the inner second fixing part 3b2 may be provided symmetrically with respect to a direction ED that equally divides the corner portion. The inner

first fixing part 3b1 and the inner second fixing part 3b2 may be fixed by the plurality of unit barrier fixing members 21b1, 21b2, 21b3, and 21b4.

[548] The inner first fixing part 3b1 may be fixed to the outer first fixing part 5b1 and provided on the inner side of the first surface, and the inner second fixing part 3b2 may be fixed to the outer second fixing part 5b2 and provided on the inner side of the second surface. In addition, the corner primary thermal insulation wall 3b may comprise an inner bent part 3b3 formed by filling a thermal insulation material between the inner first fixing part 3b1 and the inner second fixing part 3b2.

[549] When the plurality of corner blocks CB are disposed adjacent to each other along an edge of a corner portion at which the first surface and the second surface having different angles face each other, the inner bent part 3b3 may be formed in a space portion between adjacent inner first and second fixing parts 3b1 and 3b2, that is, in a space portion in which the corner secondary barrier 41b is exposed.

[550] A space may be formed between both side surfaces of the inner bent part 3b3 and side surfaces of the inner first and second fixing parts 3b1 and 3b2 in close contact therewith, and a corner inner packing material 3b8 may be installed in the space to prevent thermal convection.

[551] The upper block UUB may comprise a plurality of upper slits SL1 formed to a predetermined depth in an upper portion thereof so as to cope with contraction and expansion stresses of the corner primary thermal insulation wall 3b. The upper slits SL1 may be formed through the inner primary plywood 31b, which is an upper layer of the corner primary thermal insulation wall 3b, to at least a portion of the corner primary thermal insulation material 32b, which is an intermediate layer.

[552] The upper slits SL1 may be formed at positions corresponding to spaces between the plurality of unit barrier fixing members 21b1, 21b2, 21b3, and 21b4 installed on an upper

surface of the upper block UUB at portions respectively corresponding to the plurality of unit upper blocks UB1, UB2, UB3, and UB4 constituting the existing upper block.

[553] A barrier fixing member 21b composed of the plurality of unit barrier fixing members 21b1, 21b2, 21b3, and 21b4 may be installed on one upper block UUB. Each of the unit barrier
5 fixing members 21b1, 21b2, 21b3, and 21b4 may be made of a metallic material and installed adjacent to and parallel with each other on an upper portion of the corner primary thermal insulation wall 3b constituting the upper block UUB, and may be bent at a predetermined angle toward inner sides of the first surface and the second surface, for example, bent at the same
10 angle as an angle formed between the first surface and the second surface having different angles and forming a storage space for accommodating the liquefied gas.

[554] A corner primary barrier may be fixedly coupled onto the corner primary thermal insulation wall 3b by the barrier fixing member 21b installed at an upper end of the corner primary thermal insulation wall 3b. The corner primary barrier may be used to include the barrier fixing member 21b and the like.

[555] The upper connection block UBB is coupled to upper surfaces of adjacent lower blocks LB. The upper connection block UBB may be installed in a space exposed between adjacent
15 upper blocks UUB.

[556] The upper connection block UBB may comprise a corner connection thermal insulation wall 34b disposed outside the barrier fixing member 21b. The corner connection
20 thermal insulation wall 34b of the upper connection block UBB may be installed between the barrier fixing member 21b and the corner connection barrier 42b.

[557] The corner connection thermal insulation wall 34b may comprise a corner first connection fixing part 34b1 and a corner second connection fixing part 34b2 respectively provided on inner sides of the first surface and the second surface and configured in a structure

in which a corner first connection plywood 342b, a corner connection thermal insulation material 341b, and a corner second connection plywood 343b are sequentially stacked outward of the barrier fixing member 21b to which the corner primary barrier is fixed.

[558] The corner connection thermal insulation wall 34b may comprise a corner connection bent part 34b3 installed in a corner space portion between the corner first connection fixing part 34b1 and the corner second connection fixing part 34b2 and made of a thermal insulation material.

[559] A corner inner packing material 34b4 is inserted into and installed in a space between the corner first and second connection fixing parts 34b1 and 34b2, and the corner inner packing material 34b4 may be identical or similar to the corner inner packing material 3b8 inserted into and installed in a space between the inner first and second fixing parts 3b1 and 3b2.

[560] When the upper connection block UBB is installed between adjacent integrated upper blocks UUB, a stepped space SS may be formed between the inner first and second fixing parts 3b1 and 3b2 and the corner first and second connection fixing parts 34b1 and 34b2. A stuffing piece SP may be inserted into the stepped space SS.

[561]

[562] FIG. 40 is a partial perspective view for explaining a side opening formed in a liquefied gas storage tank according to a nineteenth embodiment of the present disclosure, FIG. 41 is a partial perspective view for explaining a sealing plate connected to the side opening formed in the liquefied gas storage tank according to the nineteenth embodiment of the present disclosure, and FIG. 42 is a partial perspective view for explaining a state in which the side opening formed in the liquefied gas storage tank according to the nineteenth embodiment of the present disclosure is covered.

[563] In FIGS. 40 to 42, the side opening 8 may be formed in a first surface among walls

defining an accommodation space for storing liquefied gas, and the first surface is omitted from FIGS. 40 to 42.

[564] The side opening 8 may serve as a passage connecting the accommodation space and an exterior of the liquefied gas storage tank 1, such that work materials and equipment may be
5 carried into or out of the storage space and workers may pass therethrough.

[565] The side opening 8 is an opened area connecting the accommodation space and the exterior, and portions of the liquefied gas storage tank 1 other than the side opening 8 may be finished or sealed.

[566] Referring to FIG. 40, the side opening 8 may be provided in a wall defining an
10 accommodation space for storing liquefied gas. The side opening 8 may be formed adjacent to a corner barrier 88 provided at a connection point between a first surface and a second surface. The first surface may correspond to a surface in which the side opening 8 is formed, and the second surface may correspond to a surface parallel to a foundation or formed toward the foundation.

[567] The side opening 8 may be formed in a plurality of surfaces of the wall. For example,
15 the side opening 8 may be formed across the first surface of the wall and a first-1 surface adjacent to the first surface.

[568] For example, the first surface may correspond to a surface parallel to the vertical
portion 121, and the second surface may correspond to a surface parallel to the bottom portion
20 122. The first surface and the second surface may form a predetermined angle with each other. For example, the first surface and the second surface may be orthogonal to each other. However, the connection angle between the first surface and the second surface is not limited to 90 degrees.

[569] The corner barrier 88 may correspond to the corner structure described above with

reference to FIGS. 37 to 39.

[570] Although the corner barrier 88 is illustrated in FIGS. 40 to 42 as having a form bent at 90 degrees, the present disclosure is not limited thereto. The corner barrier 88 may be provided at a connection point between the first surface and the second surface and may vary depending
5 on the connection angle between the first surface and the second surface.

[571] The corner barrier 88 may be divided, based on a bent portion thereof, into a portion positioned on the first surface and a portion positioned on the second surface.

[572] The side opening 8 is disposed adjacent to the corner barrier 88, and a peripheral portion thereof may be finished by a first plate 81. Although only a portion of the side opening
10 8 is illustrated in FIG. 40 and the first plate 81 is shown as having a U-shape, the first plate 81 may be formed to surround a perimeter of the side opening 8.

[573] The first plate 81 may be connected to the portion of the corner barrier 88 positioned on the first surface, and may be formed such that a portion thereof overlaps the corner barrier 88. Alternatively, the first plate 81 may be spaced apart from the corner barrier 88.

[574] The primary barrier 2 may be provided on the second surface as a barrier capable of
15 contacting liquefied gas and may be connected to the corner barrier 88. Referring to FIG. 40, the primary barrier 2 may be connected to an upper side of the corner barrier 88. The primary barrier 2 may be connected to the portion of the corner barrier 88 positioned on the second surface.

[575] The primary barrier 2 may be formed of a corrugated membrane sheet having
20 corrugations in a lattice form. The primary barrier 2 may be provided on the first surface and the second surface to form an accommodation space for storing liquefied gas.

[576] The corrugations may be divided into horizontal corrugations 21 and vertical corrugations 22 when the primary barrier 2 is provided on the second surface, and may be

divided into vertical corrugations 23 and horizontal corrugations 24 when the primary barrier 2 is provided on the first surface.

[577] Referring to FIG. 41, the sealing plate 83 may seal and connect the portion of the corner barrier 88 positioned on the first surface and the first plate 81. The sealing plate 83 may be disposed to overlap the corner barrier 88 and the first plate 81 and may seal and connect a connection portion or a gap between the corner barrier 88 and the first plate 81. The sealing plate 83 may have corrugations corresponding to the horizontal corrugations 21 of the primary barrier 2.

[578] The sealing plate 83 may correspond to a form obtained by cutting the primary barrier 2 in a longitudinal direction.

[579] The corrugations provided on the sealing plate 83 may be arranged to correspond to the horizontal corrugations 21 of the primary barrier 2. The corrugations provided on the sealing plate 83 may be arranged on extensions of the horizontal corrugations 21 of the primary barrier 2.

[580] The connection barrier 85 may connect the sealing plate 83 and the primary barrier 2 provided on the second surface.

[581] The connection barrier 85 may cover a plurality of upper slits SL1 formed in the corner barrier 88, and one side thereof may be connected to the sealing plate 83 while the other side thereof may be connected to the primary barrier 2. Specifically, the connection barrier 85 may connect the corrugations of the sealing plate 83 and the horizontal corrugations 21 of the primary barrier 2.

[582] In addition, the connection barrier 85 may have one side provided on the first surface and connected to the primary barrier 2 in contact with the sealing plate 83 or the corner barrier 88, and the other side connected to the primary barrier 2 provided on the second surface.

[583] The connection barrier 85 may comprise corrugations having a shape similar to corrugations extending in one direction among the corrugations in a lattice form provided on the primary barrier 2. The connection barrier 85 may comprise corrugations having a similar shape and may cover the corrugations of the sealing plate 83 and the corrugations of the primary barrier 2.

[584] In FIG. 41, a plurality of connection barriers 85 are illustrated, each covering one upper slit SL1 and one corrugation. The connection barrier 85 may cover at least one upper slit SL1 and at least one corrugation, and thus is not limited to the form illustrated in FIG. 41.

[585] In FIG. 41, the sealing plate 83 may seal the first plate 81 and the portion of the corner barrier 88 positioned on the first surface, and the connection barrier 85 may cover the sealing plate 83 and the primary barrier 2. The sealing plate 83 and the connection barrier 85 may seal areas other than the side opening 8 in the accommodation space so as to prevent leakage of liquefied gas.

[586] When work in the accommodation space excluding the side opening 8 is completed, unnecessary materials and equipment may be carried out to the exterior, and the side opening 8 may be closed. The first plate 81 finishing a peripheral portion of the side opening 8 may be removed. When the first plate 81 is removed, a portion of the sealing plate 83 adjacent to the first plate 81 may be cut.

[587] Referring to FIG. 41, the sealing plate 83 may be cut along a cutting line 87 illustrated above the sealing plate 83. The cutting line 87 may be formed on the first surface. A portion of the sealing plate 83 may be removed together with the first plate 81.

[588] When removal of the first plate 81 and cutting of the sealing plate 83 are completed, the primary barrier 2 may be provided on the first surface. Referring to FIG. 42, the side opening 8 may be covered by additionally providing the primary barrier 2 on the first surface.

The primary barrier 2 provided on the first surface may be disposed in contact with the sealing plate 83 or the corner barrier 88.

[589] The side opening 8 may have a thermal insulation panel including a thermal insulation wall installed therein. The thermal insulation panel may be inserted into the side opening 8 to close an opening of the side opening 8. The thermal insulation panel may have a size corresponding to the opening of the side opening 8. The thermal insulation panel may have a structure in which a thermal insulation wall and a barrier are stacked.

[590] The thermal insulation panel may comprise a primary barrier 2 provided on the first surface and covering the side opening 8 inward of the thermal insulation panel.

[591] The primary barrier 2 provided on the first surface may be arranged to correspond to the primary barrier 2 provided on the second surface. The primary barriers 2 disposed on the first surface and the second surface may be arranged such that corrugations thereof face each other. The vertical corrugations 23 of the primary barrier 2 provided on the first surface may be arranged in line with the corrugations of the sealing plate 83. The vertical corrugations 23 of the primary barrier 2 provided on the first surface may be arranged on the same line as or on extensions of the horizontal corrugations 21 of the primary barrier 2 provided on the second surface.

[592] The primary barrier 2 may be additionally provided on the first surface and connected to a cut portion of the sealing plate 83. The sealing plate 83 may be cut along the cutting line 87 to facilitate connection with the primary barrier 2.

[593] The portion of the corner barrier 88 positioned on the first surface may be directly connected to the primary barrier 2 provided on the first surface or may be connected thereto through the sealing plate 83. The portion of the corner barrier 88 positioned on the second surface may be directly connected to the primary barrier 2 provided on the second surface.

[594] In the liquefied gas storage tank 1 according to the nineteenth embodiment of the present disclosure, the side opening 8 may be formed adjacent to the corner barrier 88. A portion of the side opening 8 may be adjacent to or in contact with the corner barrier 88.

[595] When the side opening 8 is disposed at a considerable distance above the corner barrier 88, all areas of the side opening 8 may be connected to a flat barrier. The peripheral portions of the side opening 8 may all have the same finishing configuration.

[596] However, when the side opening 8 is disposed adjacent to the corner barrier 88 as in the present embodiment, a lower area of the side opening 8 may be adjacent to or connected to the corner barrier 88. The lower area of the side opening 8 may have a finishing structure different from that of the remaining areas.

[597] According to the present embodiment, the corner barrier 88 and the first plate 81 finishing the side opening 8 may be efficiently finished through the sealing plate 83 and the connection barrier 85.

[598] The present embodiment may be easily applied to a small-sized tank or a mock-up tank because the side opening 8 is formed at a lower position relatively close to the foundation or the corner barrier 88, and the height of the side opening 8 is lowered, thereby improving transportation of materials and equipment and movement of workers.

[599] The liquefied gas storage tank 1 according to the nineteenth embodiment of the present disclosure may comprise a side opening installation step S100, a sealing plate installation step S200, a connection barrier installation step S300, a removal step S400, and a covering step S500.

[600] In the side opening installation step S100, the side opening 8 opened in the first surface of the accommodation space may be installed adjacent to the corner barrier 88. The side opening installation step S100 may comprise installing a first plate 81 for finishing a peripheral

portion of the side opening 8.

[601] The sealing plate installation step S200 may be a step of installing the sealing plate 83 between the first plate 81 and the corner barrier 88. The sealing plate 83 may seal and connect the portion of the corner barrier 88 positioned on the first surface and the first plate 81.

5 [602] The sealing plate installation step S200 may prevent leakage of liquefied gas between the first plate 81 and the corner barrier 88 by installing the sealing plate 83. In the sealing plate installation step S200, the primary barrier 2 may be installed on the second surface.

[603] The connection barrier installation step S300 may be a step of installing the connection barrier 85 that connects the sealing plate 83 and the primary barrier 2 provided on the second
10 surface. The connection barrier 85 may be provided with corrugations having a shape similar to that of the corrugations of the primary barrier 2. The connection barrier 85 may cover a plurality of upper slits SL1 formed in the corner barrier 88, and one side thereof may be connected to the sealing plate 83 while the other side thereof may be connected to the primary barrier 2.

15 [604] The removal step S400 may be a step of removing the first plate 81 that finishes a peripheral portion of the side opening 8 after work and cleanup of the accommodation space are completed. The removal step S400 may comprise cutting a portion of the sealing plate 83 together with removal of the first plate 81. An upper portion of the sealing plate 83 above the cutting line 87 may be cut and removed together with the first plate 81.

20 [605] The covering step S500 may be a step of covering the side opening 8 through the primary barrier 2. The covering step S500 may block the opened side opening 8 by additionally providing the primary barrier 2 on the first surface. In the covering step S500, the primary barrier 2 provided on the first surface may be connected to an upper side of the sealing plate 83.

[606] According to one aspect of the present disclosure, there is provided a method of manufacturing a liquefied gas storage tank, the method comprising: installing a corner barrier at a connection point between a first surface of a wall forming an accommodation space for storing liquefied gas and a second surface forming a predetermined angle with the first surface; installing a side opening adjacent to the corner barrier on the first surface; installing a first plate at a peripheral portion of the side opening; installing a sealing plate between the first plate and the corner barrier; installing a primary barrier connected to the corner barrier on the second surface; and installing a connection barrier between the sealing plate and the primary barrier.

[607] Specifically, the method may further comprise: cutting a portion of the sealing plate and removing the first plate; installing a thermal insulation panel including a thermal insulation wall inside the side opening; and installing a primary barrier covering the side opening on the first surface.

[608]

[609] FIG. 43 is a partial perspective view illustrating a sealing plate connected to a side opening formed in a liquefied gas storage tank according to a twentieth embodiment of the present disclosure, FIG. 44 is a partial perspective view illustrating a sealing plate connected to a primary barrier at a side opening formed in the liquefied gas storage tank according to the twentieth embodiment of the present disclosure, and FIG. 45 is a partial perspective view illustrating a side opening formed in the liquefied gas storage tank according to the twentieth embodiment of the present disclosure being covered.

[610] The liquefied gas storage tank 1 according to the twentieth embodiment of the present disclosure may differ from the liquefied gas storage tank 1 according to the nineteenth embodiment of the present disclosure described above in the sealing plate 83.

[611] The side opening 8, the first plate 81, the corner barrier 88, and the primary barrier 2

may be identical to those of the liquefied gas storage tank 1 according to the nineteenth embodiment of the present disclosure.

[612] The side opening 8 may be provided on a first surface of a wall defining an accommodation space for storing liquefied gas, and the first plate 81 may finish peripheral portions of the side opening 8. The corner barrier 88 may be provided at a connection point between the first surface of the wall and a second surface forming a predetermined angle with the first surface, and the first plate 81 may be connected thereto. The primary barrier 2 may be provided on the second surface and may be connected to the corner barrier 88.

[613] The side opening 8 may be formed across the first surface of the wall and a first-1 surface adjacent to the first surface. The first surface and the second surface may be perpendicular to each other.

[614] Referring to FIG. 43, the sealing plate 83 may seal and connect a portion of the corner barrier 88 positioned on the second surface and the first plate 81. The sealing plate 83 may be formed in a bent shape and may be provided above the corner barrier 88.

[615] The sealing plate 83 may have a bent side cross-sectional shape and may extend along a width direction of the side opening 8. The sealing plate 83 may be formed to have a width greater than that of the side opening 8.

[616] The sealing plate 83 may be formed to have a width greater than that of the first plate, thereby sealing and connecting an area where the first plate and the corner barrier 88 are adjacent to each other.

[617] A portion of the sealing plate 83 may be provided on the first surface, and the remaining portion thereof may be provided on the second surface. The sealing plate 83 may be bent so as to be connected to both the first surface and the second surface simultaneously.

[618] The sealing plate 83 may cover a plurality of upper slits SL1 formed in the corner

barrier 88.

[619] The sealing plate 83 of FIG. 43 may simultaneously perform the functions of the sealing plate 83 and the connection barrier 85 of FIG. 41.

[620] Referring to FIG. 44, the sealing plate 83 may be connected to the primary barrier 2 provided on the second surface. The sealing plate 83 may be formed in a bent shape such that one side thereof is connected to the first plate 81 and the other side thereof is connected to the primary barrier 2.

[621] The sealing plate 83 may seal and connect the primary barrier 2 and the first plate 81, thereby preventing liquefied gas from leaking between the primary barrier 2 and the first plate 81.

[622] The sealing plate 83 may have a flat surface. The sealing plate 83 may be formed to have a smooth surface, unlike the corrugations formed in the primary barrier 2.

[623] The sealing plate 83 may be connected without consideration of the arrangement of the corrugations of the primary barrier 2.

[624] When the sealing plate 83 is connected to the primary barrier 2, the corrugations of the primary barrier 2 may be spaced apart from a surface of the sealing plate 83. The sealing plate 83 may be connected to a surface between adjacent corrugations of the primary barrier 2, and the corrugations of the primary barrier 2 may protrude upward from the sealing plate 83.

[625] A reinforcing member may be installed inside the corrugations of the primary barrier 2, and the reinforcing member may be connected to the sealing plate 83 to prevent leakage of liquefied gas.

[626] When work in the accommodation space except for the side opening 8 is completed, unnecessary materials and equipment may be carried out to the outside, and the side opening 8

may be closed. The first plate 81 and the sealing plate 83, which finish peripheral portions of the side opening 8, may be removed. The sealing plate 83 may be removed simultaneously with removal of the first plate 81 or sequentially thereafter.

[627] Referring to FIG. 44, the sealing plate 83 and the primary barrier 2 may be cut along the cutting line 87 shown in the primary barrier 2. When the sealing plate 83 or the first plate 81 is removed, a portion of the primary barrier 2 adjacent to the sealing plate 83 may be cut.

[628] The cutting line 87 may correspond to a portion of an overlapping area between the sealing plate 83 and the primary barrier 2 or to a boundary line of the sealing plate 83 provided on the second surface. The cutting line 87 may be formed on the second surface.

[629] Since a portion of the primary barrier 2 may be cut along the cutting line 87, the primary barrier 2 may be manufactured to be larger than a standard size or a designed size in consideration of the cutting operation.

[630] A horizontal length of approximately 10 mm to 100 mm of the primary barrier 2 adjacent to the sealing plate 83 may be cut. Specifically, a horizontal length of approximately 40 mm of the primary barrier 2 may be cut. The horizontal corrugations 21 of the primary barrier 2 may also be cut together with the sealing plate 83.

[631] After the first plate 81 is removed and the sealing plate 83 and the primary barrier 2 are completely cut and removed, the primary barrier 2 may be provided on the first surface. Referring to FIG. 45, the side opening 8 may be covered by additionally providing the primary barrier 2 on the first surface.

[632] The liquefied gas storage tank 1 may comprise a thermal insulation wall and a thermal insulation panel installed inside the side opening 8 when the sealing plate 83 or the first plate 81 is removed. In addition, the liquefied gas storage tank 1 may comprise the primary barrier 2 provided on the first surface and covering the side opening 8 inward of the thermal insulation

panel.

[633] The primary barrier 2 provided on the first surface may be connected to the corner barrier 88. The primary barrier 2 provided on the first surface may be disposed to be in contact with the corner barrier 88. The primary barrier 2 provided on the first surface may be disposed
5 to be in contact with a portion of the corner barrier 88 positioned on the first surface.

[634] The primary barrier 2 provided on the first surface may be disposed to correspond to the primary barrier 2 provided on the second surface. The primary barriers 2 disposed on the first surface and the second surface may be arranged such that corrugations thereof face each other. The vertical corrugations 23 of the primary barrier 2 provided on the first surface may
10 be arranged on a straight line or an extension line of the horizontal corrugations 21 of the primary barrier 2 provided on the second surface.

[635] The connection barrier 85 may be arranged on a straight line or an extension line of the vertical corrugations 23 and the horizontal corrugations 21. One side of the connection barrier 85 may be connected to the primary barrier 2 provided on the first surface, and the other
15 side thereof may be connected to the primary barrier 2 provided on the second surface.

[636] Specifically, the connection barrier 85 may connect the vertical corrugations 23 of the primary barrier 2 provided on the first surface and the horizontal corrugations 21 of the primary barrier 2 provided on the second surface.

[637] The connection barrier 85 may comprise corrugations having a shape similar to that of
20 corrugations extending in one direction among the corrugations in a lattice form provided in the primary barrier 2. The connection barrier 85 may comprise corrugations having a shape similar to that of the corrugations and may cover the vertical corrugations 23 and the horizontal corrugations 21 of the primary barrier 2.

[638] The connection barrier 85 may cover a plurality of upper slits SL1 formed in the corner

barrier 88 in place of the sealing plate 83. The connection barrier 85 may be disposed at a position previously occupied by the sealing plate 83 before removal thereof.

[639] In FIG. 45, a plurality of connection barriers 85 are illustrated, each covering one upper slit SL1. However, the connection barrier 85 may cover one or more upper slits SL1 and thus
5 is not limited to the configuration illustrated in FIG. 45.

[640] In FIG. 45, the connection barrier 85 may be disposed above the primary barrier 2 provided on the first surface and the primary barrier 2 provided on the second surface so as to cover the primary barriers 2. A portion of the corner barrier 88 positioned on the first surface may be directly connected to the primary barrier 2 provided on the first surface, and a portion
10 of the corner barrier 88 positioned on the second surface may be directly connected to the primary barrier 2 provided on the second surface.

[641] The corner barrier 88 may be directly connected to the primary barrier 2 provided on the first surface and the primary barrier 2 provided on the second surface, respectively.

[642] The liquefied gas storage tank 1 according to the twentieth embodiment of the present
15 disclosure may comprise a side opening installation step S100, a sealing plate installation step S200, a removal step S300, a covering step S400, and a connection barrier installation step S500.

[643] The side opening installation step S100 may comprise installing the side opening 8 opened in the first surface of an accommodation space adjacent to the corner barrier 88. The
20 side opening installation step S100 may comprise installing the first plate 81 that finishes peripheral portions of the side opening 8.

[644] The sealing plate installation step S200 may be a step of installing the sealing plate 83 between the first plate 81 and the corner barrier 88. The sealing plate 83 may seal and connect the first plate 81 and a portion of the corner barrier 88 positioned on the second surface. The

portion of the corner barrier 88 positioned on the second surface may also be connected to the sealing plate 83.

[645] The sealing plate installation step S200 may prevent leakage of liquefied gas between the first plate 81 and the corner barrier 88 by installing the sealing plate 83. The sealing plate
5 installation step S200 may cover a plurality of upper slits SL1 formed in the corner barrier 88 through the bent sealing plate 83. In the sealing plate installation step S200, the primary barrier 2 may be installed on the second surface.

[646] The removal step S300 may be a step of removing the first plate 81 and the sealing plate 83, which finish peripheral portions of the side opening 8, after work and cleanup of the
10 accommodation space are completed. In the removal step S300, a portion of the primary barrier 2 may be cut together with removal of the first plate 81 and the sealing plate 83. A portion of the primary barrier 2 may be cut along the cutting line 87.

[647] The covering step S400 may be a step of covering the side opening 8 through the primary barrier 2. The covering step S400 may block the opened side opening 8 by additionally
15 providing the primary barrier 2 on the first surface. In the covering step S400, the primary barrier 2 provided on the first surface may be connected to an upper side of the corner barrier 88.

[648] In the covering step S400, the primary barrier 2 provided on the first surface may be disposed to correspond to the primary barrier 2 provided on the second surface. The vertical
20 corrugations 23 of the primary barrier 2 provided on the first surface may be arranged on a straight line or an extension line of the horizontal corrugations 21 of the primary barrier 2 provided on the second surface.

[649] The connection barrier installation step S500 may be a step of installing the connection barrier 85 connecting the primary barrier 2 provided on the first surface and the primary barrier

2 provided on the second surface. The connection barrier 85 may be provided with corrugations having a shape similar to that of the corrugations of the primary barrier 2.

[650] The connection barrier 85 may cover a plurality of upper slits SL1 formed in the corner barrier 88, and one side thereof may be connected to the primary barrier 2 provided on the first surface while the other side thereof may be connected to the primary barrier 2 provided on the second surface.

[651] In the connection barrier installation step S500, the connection barrier 85 may be installed to connect the vertical corrugations 23 of the primary barrier 2 and the horizontal corrugations 21 of the primary barrier 2. The connection barrier 85 may be installed after the primary barriers 2 are installed on the first surface and the second surface.

[652] According to one embodiment of the present disclosure, there is provided a method of manufacturing a liquefied gas storage tank, the method comprising: installing a corner barrier at a connection point between a first surface of a wall defining an accommodation space storing liquefied gas and a second surface forming a predetermined angle with the first surface; installing a side opening adjacent to the corner barrier on the first surface; installing a first plate at peripheral portions of the side opening; installing a sealing plate between the first plate and the corner barrier; and installing a primary barrier connected to the corner barrier on the second surface.

[653] Specifically, the method may further comprise: cutting a portion of the primary barrier and removing the first plate; installing a thermal insulation panel including a thermal insulation wall inside the side opening; installing a primary barrier covering the side opening on the first surface; and installing a connection barrier on the primary barrier provided on the first surface and the primary barrier provided on the second surface.

[654] FIG. 46 is a partial perspective view illustrating a side opening formed in a liquefied

gas storage tank according to a twenty-first embodiment of the present disclosure, FIG. 47 is a view illustrating a process of covering an outer gap adjacent to a side opening formed in the liquefied gas storage tank according to the twenty-first embodiment of the present disclosure, and FIG. 48 is a view illustrating a process of covering an inner gap adjacent to a side opening
5 formed in the liquefied gas storage tank according to the twenty-first embodiment of the present disclosure.

[655] In the liquefied gas storage tank 1 according to the twenty-first embodiment of the present disclosure, an accommodation space for storing liquefied gas may be formed by a wall. The wall may comprise a plurality of surfaces, and the plurality of surfaces may be connected
10 to form a polygon. The accommodation space may have a polygonal planar cross section.

[656] Referring to FIG. 46, the side opening 8 may be formed across two adjacent surfaces of the wall. The side opening 8 may be formed across a first surface 110 of the wall and a first-
1 surface 111 adjacent to the first surface 110. The side opening 8 may be formed across a plurality of surfaces of the wall.

[657] The side opening 8 may be formed across the first surface 110 and the first-1 surface 111, and thus a planar cross section of the side opening 8 may have a bent shape. The side
15 opening 8 may not be provided on the same plane.

[658] The side opening 8 may be formed adjacent to the corner barrier 88. A lower portion of the side opening 8 may be provided adjacent to the corner barrier 88 connecting the first
20 surface and the second surface.

[659] FIG. 46 illustrates a view of the side opening 8 as viewed from the accommodation space, which is an inner side of the liquefied gas storage tank 1. A center portion of the side opening 8 may protrude outward relative to opposite ends thereof. In a planar cross section of the side opening 8, the center portion may protrude outward relative to the opposite ends thereof.

[660] The planar cross section of the side opening 8 may have a bent shape at the center portion, and the opposite ends thereof may have a shape inclined inward with respect to the center portion. The planar cross section of the side opening 8 may have a polygonal shape rather than a straight-line shape.

5 [661] The side opening 8 may be formed across a plurality of surfaces of the wall and may have a width greater than that of any one surface of the wall.

[662] The side opening 8 may be formed across the first surface 110 and the first-1 surface 111 and may have a width greater than that of the first surface 110 or the first-1 surface 111. The side opening 8 of FIG. 46 may have a relatively greater width than a side opening provided
10 on a single surface.

[663] Even when the side opening 8 of FIG. 46 has the same height as a side opening provided on a single surface, the side opening 8 of FIG. 46 may have a greater width and thus may have a larger vertical cross section. The side opening 8 of FIG. 46 may form a large opening, thereby facilitating transportation of materials and equipment and movement of
15 workers.

[664] An inner side of the accommodation space may be finished with the primary barrier 2 and the secondary barrier 4. The primary barrier 2 may be capable of directly contacting liquefied gas on the inner side of the accommodation space. The secondary barrier 4 may be provided between the primary barrier 2 and the wall.

20 [665] FIGS. 47(a) to 47(c) are views illustrating a process of covering a secondary temporary barrier 40 provided on the wall and are enlarged views of area A or area B of FIG. 46.

[666] The secondary temporary barrier 40 may extend from the secondary barrier 4 provided on the wall.

[667] The secondary temporary barrier 40 and the secondary barrier 4 may each be provided on a plurality of surfaces of the wall. The secondary temporary barrier 40 and the secondary barrier 4 may each be provided on the first surface 110 and the first-1 surface 111 on which the side opening 8 is formed in the wall.

5 [668] The surface of the wall on which the side opening 8 is not formed may be configured such that the secondary barriers 4 extend while being in contact with each other, and thus the secondary temporary barrier 40 may be omitted. The secondary temporary barrier 40 may be formed between an end of the secondary barrier 4 and the side opening 8. The secondary temporary barrier 40 may seal the secondary barrier 4 by finishing the end of the secondary
10 barrier 4.

[669] Referring to FIG. 47(a), the secondary barrier 4 provided on the first surface 110 and the secondary barrier 4 provided on the first-1 surface 111 may be connected to each other. An outer gap 93, which is a gap space, may be formed between the secondary temporary barrier 40 provided on the first surface 110 and the secondary temporary barrier 40 provided on the
15 first-1 surface 111.

[670] The outer gap 93 may be formed between the secondary barrier 4 and the side opening 8. Since the side opening 8 is formed across the first surface 110 and the first-1 surface 111, which are not located on the same plane, the outer gap 93 may be formed at a portion where the first surface 110 and the first-1 surface 111 meet.

20 [671] Referring to FIG. 47(b), at least a portion of the outer gap 93 may be covered by a cover member 90. The cover member 90 may prevent flow of liquefied gas and thus may block the outer gap 93 by covering the outer gap 93. The cover member 90 may cover the outer gap 93 and thereby seal the ends of the secondary barriers 4.

[672] In FIG. 47(b), the cover member 90 may cover the outer gap 93 through a single

covering operation. However, the present disclosure is not limited thereto, and cover members 90 having various sizes may cover the outer gap 93 through one or more covering operations.

[673] Referring to FIG. 47(c), an additional cover member 91 may be provided above the secondary barrier 4 and the secondary temporary barrier 40. Upper sides of the secondary barrier 4 and the secondary temporary barrier 40 may face the accommodation space and may correspond to inner sides with respect to the liquefied gas storage tank 1.

[674] The additional cover member 91 may simultaneously cover the cover member 90 covering the outer gap 93 and the secondary barrier 4. The additional cover member 91 may be selectively provided. The cover member 90 and the additional cover member 91 may cover the secondary barrier 4, the secondary temporary barrier 40, or the outer gap 93 in various forms.

[675] FIGS. 48(a) and 48(b) are views illustrating a process of covering a primary temporary barrier 20 extending from the primary barrier 2 and are enlarged views of area A or area B of FIG. 46.

[676] The primary barrier 2 may be provided on an inner side of the secondary barrier 4, and the primary temporary barrier 20 may be provided on an inner side of the secondary temporary barrier 40. Referring to FIG. 48(a), the primary temporary barrier 20 may extend from the primary barrier 2 provided on the inner side of the secondary barrier 4.

[677] The primary temporary barrier 20 may be formed between an end of the primary barrier 2 and the side opening 8. The primary temporary barrier 20 may seal the primary barrier 2 by finishing an end of the primary barrier 2. On a surface of the wall on which the side opening 8 is not formed, the primary barriers 2 may extend while being in contact with each other, and thus the primary temporary barrier 20 may be omitted.

[678] An inner gap 95 may be formed between the primary temporary barriers 20 adjacent

to an inner side of the outer gap 93 covered by the cover member 90. An inner gap 95, which is a gap space, may be formed between the primary temporary barrier 20 provided on the first surface 110 and the primary temporary barrier 20 provided on the first-1 surface 111.

5 [679] The inner gap 95 may be located inward of the outer gap 93, which is positioned at an upper side in FIG. 48(a).

[680] Referring to FIG. 48(b), the inner gap 95 may be covered by the cover member 90. The cover member 90 may prevent flow of liquefied gas and thus may block the inner gap 95 by covering the inner gap 95. The cover member 90 may cover the inner gap 95 and thereby seal the ends of the primary barriers 2.

10 [681] The cover member 90 covering the inner gap 95 and the cover member 90 covering the outer gap 93 may be identical to each other. However, the present disclosure is not limited thereto, and different cover members 90 may be used.

[682] The primary temporary barrier 20 may be provided on an inner side after the outer gap 93 is covered by the cover member 90 and the additional cover member 91. The inner gap 95
15 may be located inward of the outer gap 93, and the outer gap 93 formed outward of the inner gap 95 may be in a state of being covered by the cover member 90.

[683] The outer gap 93 and the inner gap 95 may be formed as the side opening 8 is formed across the first surface 110 and the first-1 surface 111. When the side opening 8 is formed on the first surface 110 or the first-1 surface 111, the outer gap 93 and the inner gap 95 may not
20 be formed. When the side opening 8 is formed on a single surface of the wall, the outer gap 93 and the inner gap 95 may not be formed.

[684] The outer gap 93 and the inner gap 95 may be formed as the side opening 8 is formed across a plurality of surfaces of the wall of the accommodation space having a polygonal planar cross section. The outer gap 93 and the inner gap 95 may be formed in area A and area B of

FIG. 46, respectively.

[685] The liquefied gas storage tank 1 according to the twenty-first embodiment of the present disclosure may finish the outer gap 93 and the inner gap 95, which are formed due to the arrangement of the side opening 8, through the cover member 90.

5 [686] In the liquefied gas storage tank according to the twenty-first embodiment of the present disclosure, the side opening 8 may be provided adjacent to a corner barrier 88 provided at a connection point between a first surface of the wall and a second surface forming a predetermined angle with the first surface.

[687] The liquefied gas storage tank may comprise a sealing plate 83 sealingly connecting a
10 portion of the corner barrier 88 positioned on the second surface and a first plate 81 finishing peripheral portions of the side opening 8.

[688] When the first plate 81 is removed, a portion of the sealing plate 83 adjacent to the first plate 81 may be cut.

[689] The liquefied gas storage tank 1 may comprise: a thermal insulation panel including a
15 thermal insulation wall and installed inside the side opening 8 when the first plate 81 is removed; and a primary barrier provided on the first surface and covering the side opening 8 inward of the thermal insulation panel, wherein the sealing plate 83 may be configured such that a cut portion thereof is connected to the primary barrier 2 provided on the first surface.

[690] The liquefied gas storage tank may comprise a sealing plate 83 sealingly connecting a
20 portion of the corner barrier positioned on the second surface and a first plate 81 finishing peripheral portions of the side opening 8.

[691] The liquefied gas storage tank may comprise a primary barrier 2 provided on the second surface and connected to the corner barrier 88, wherein, when the sealing plate 83 or the first plate 81 is removed, a portion of the primary barrier 2 adjacent to the sealing plate 83

may be cut.

[692] The liquefied gas storage tank may comprise: a thermal insulation panel including a thermal insulation wall and installed inside the side opening 8 when the sealing plate 83 or the first plate 81 is removed; a primary barrier 2 provided on the first surface and covering the side opening 8 inward of the thermal insulation panel; and a connection barrier 85 having one side connected to the primary barrier 2 provided on the first surface and the other side connected to the primary barrier 2 provided on the second surface.

[693] The liquefied gas storage tank according to an embodiment of the present disclosure may achieve effects such as facilitating manufacture, reducing manufacturing costs, and improving maintenance by improving structures such as thermal insulation walls and barriers at least in a bottom portion thereof.

[694] The present disclosure is not limited to the embodiments described above, and combinations of the embodiments or a combination of at least one of the embodiments and a known technology may be included as another embodiment.

[695] Although the present disclosure has been described in detail through specific embodiments, these embodiments are provided merely for illustrative purposes. The present disclosure is not limited thereto, and it will be apparent that various modifications and improvements may be made by those skilled in the art within the technical spirit of the present disclosure.

[696] Simple modifications or alterations of the present disclosure all fall within the scope of the present disclosure, and the specific scope of protection of the present disclosure will be clarified by the appended claims.

[CLAIMS]

[Claim 1]

A liquefied gas storage tank storing liquefied gas, comprising:
a barrier contacting the liquefied gas and forming a storage space accommodating the
5 liquefied gas; and a plurality of thermal insulation walls installed on a support structure and
provided on an outer side of the barrier,
wherein the liquefied gas storage tank comprises:
a plurality of bonding strips provided along a first direction on outer surfaces, fixed
to the support structure, of the plurality of thermal insulation walls, respectively; and
10 a plurality of sealing strips provided along a second direction different from the first
direction.

[Claim 2]

The liquefied gas storage tank according to claim 1,
wherein the plurality of sealing strips comprise:
15 first sealing strips provided along the second direction on the plurality of thermal
insulation walls, respectively; and
second sealing strips provided along the second direction between adjacent pairs of
the plurality of thermal insulation walls.

[Claim 3]

20 The liquefied gas storage tank according to claim 1,
wherein the plurality of sealing strips are configured to block thermal convection
occurring through spaces between the plurality of bonding strips and spaces between the
plurality of thermal insulation walls.

[Claim 4]

25 A liquefied gas storage tank storing liquefied gas, comprising:

a primary barrier contacting the liquefied gas and forming a storage space for the liquefied gas; and at least one thermal insulation wall installed on a support structure and provided on an outer side of the primary barrier,

wherein the liquefied gas storage tank comprises:

5 a secondary barrier installed between the at least one thermal insulation wall and provided from a bottom of the storage space to a predetermined height; and

a lower barrier finishing part fixing the secondary barrier to the support structure,

wherein the lower barrier finishing part comprises:

an embedded plate embedded and installed along an inner circumferential surface of
10 the support structure at the predetermined height from a bottom of the storage tank; and
a protruding plate protruding inward from the embedded plate.

[Claim 5]

The liquefied gas storage tank according to claim 4, comprising:

a step-buffering means configured to alleviate an inward-outward step difference
15 between the protruding plate and the secondary barrier; and

a sealing plate having a bent shape, contacting an outer surface of the step-buffering means, and sealingly connecting the protruding plate and the secondary barrier.

[Claim 6]

The liquefied gas storage tank according to claim 5,

20 wherein the step-buffering means comprises:

an upper horizontal plate; a vertical plate connected to the upper horizontal plate; and
a lower horizontal plate connected to the vertical plate and parallel to the upper horizontal plate.

[Claim 7]

25 The liquefied gas storage tank according to claim 5,

wherein the sealing plate comprises:

an upper portion extending horizontally and bonded to the upper horizontal plate of the step-buffering means by an adhesive; and

5 a lower portion extending vertically and bonded to the secondary barrier by the adhesive.

[Claim 8]

The liquefied gas storage tank according to claim 4,

wherein the lower barrier finishing part comprises:

10 a sealing plate having a bent shape and sealingly connecting the protruding plate and the secondary barrier; and

a block member provided between a lower surface of the sealing plate and an upper end of the thermal insulation wall.

[Claim 9]

The liquefied gas storage tank according to claim 8,

15 wherein the sealing plate comprises:

an upper portion extending horizontally and bonded to an upper surface of the protruding plate by an adhesive; and

a lower portion extending vertically and bonded to the secondary barrier by the adhesive.

20 [Claim 10]

A liquefied gas storage tank storing liquefied gas, comprising:

a primary barrier contacting the liquefied gas and forming a storage space for the liquefied gas; and a thermal insulation wall installed on a support structure and provided on an outer side of the primary barrier,

wherein the liquefied gas storage tank comprises an upper barrier finishing part
fixing the primary barrier to the support structure,

wherein the upper barrier finishing part comprises:

- an embedded plate embedded and installed along an inner circumferential surface of
5 the support structure at an upper portion of the support structure;
a protruding plate protruding inward from the embedded plate; and
a sealing plate having a bent shape and sealingly connecting the protruding plate and
the primary barrier.

[Claim 11]

- 10 The liquefied gas storage tank according to claim 10,
wherein the upper barrier finishing part further comprises:
a closing block provided between the thermal insulation wall and the protruding plate
and between the thermal insulation wall and the sealing plate.

[Claim 12]

- 15 The liquefied gas storage tank according to claim 11,
wherein the upper barrier finishing part further comprises:
a panel joint inserted into and installed in a tolerance section formed between the
thermal insulation wall and the closing block.

[Claim 13]

- 20 A liquefied gas storage tank comprising:
a wall forming an accommodation space storing liquefied gas and having a polygonal
planar cross section; and
a side opening formed in the wall,
wherein the side opening is formed across a first surface of the wall and a first-1
25 surface bendably connected to the first surface.

[Claim 14]

The liquefied gas storage tank according to claim 13, comprising:

a barrier provided on an inner side of the wall; and

a temporary barrier provided at an end of the barrier facing the side opening.

5 [Claim 15]

The liquefied gas storage tank according to claim 14,

wherein a gap is formed between the temporary barriers respectively provided on the first surface and the first-1 surface, and

the liquefied gas storage tank further comprises a cover member covering at least a
10 portion of the gap.