

LNG carrier vessel, and method for manufacturing such an LNG carrier vessel.

Field of the invention

5 The present invention relates to an LNG carrier vessel. Also the invention relates to a method for manufacturing such an LNG carrier vessel. Moreover, the invention relates to a floating LNG plant.

Background

10 A floating LNG plant which is basically a floating production, storage and offloading (FPSO) vessel for LNG, is typically used by the offshore oil and gas industry for the processing of natural gas feeds and for storage of liquefied natural gas (LNG). The FPSO vessel is designed to receive a feed gas comprising natural gas and other components from a nearby platform or from a subsea well. The received feed gas
15 is processed by processing equipment on the vessel to separate the natural gas from the other components, then liquefied by cooling to cryogenic temperature, and stored as liquefied natural gas in tanks on the FPSO until the liquid is transferred to an LNG carrier that will transport it to a land terminal.

 Typically spherical storage tanks are used to store the LNG on the FPSO. Such
20 spherical tanks are for example known as Moss-type tanks that consist of a spherical volume within a thermally isolated shell. However the spherical shape of the storage tanks is inefficient in terms of space occupancy and causes the tanks to protrude through the main deck, so that the deck cannot be used for other purposes such as processing equipment. So in FPSOs that use spherical LNG tanks there is a trade-off
25 between storage capacity and production capacity. Larger LNG storage capacity as above described cannot be achieved without a significant reduction in the plant's processing footprint.

 JP 2011230550 discloses an LNG-FPSO system that includes: a plant for generating a liquefied gas from a natural gas; a first tank; second tanks different in kind
30 from the first tank, on a float. The LNG-FPSO system stores the liquefied gas generated in the plant into the first tank, thereafter transports the liquefied gas from the first tank to the second tanks, thereby reducing a half-load period of the second tanks as compared with the first tank, as well as the probability that the second tanks are

damaged by sloshing. Tanks likely to be damaged by sloshing are used for the second tanks to reduce the damage due to sloshing.

It is an object of the invention to overcome one or more of the disadvantages from the prior art.

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Summary of the invention

The object is achieved by an LNG carrier vessel being provided with a hull, a main deck, a plurality of cargo holds below the main deck, and LNG storage tanks, wherein

- 10 - a first number of the cargo holds are configured as primary cargo holds that each comprise a first type LNG storage tank arranged as a spherical type LNG tank inside the hull with a portion of the spherical tank protruding above the main deck;
- a second number of the cargo holds configured as secondary cargo holds that each either are void of an LNG storage tank or comprise a second type LNG storage tank
- 15 that is not a spherical-type LNG tank and fits into the respective cargo hold;
- the sum of the first number and second number being equal to the plurality;
- a first portion of an area of the main deck above the secondary cargo holds is provided with process equipment for LNG processing;
- and if the respective second cargo hold is equipped with a second type LNG storage
- 20 tank, a second portion of the area of the main deck above the secondary cargo holds is free from processing equipment and comprises an open space with an opening for access to the second type LNG storage tank in the respective secondary cargo hold..

The invention has the advantage that by arranging a second non-spherical type of LNG storage tank in a number of the cargo holds while in other cargo holds the

25 spherical LNG storage tanks are installed, the ratio of space required for processing equipment and space for LNG storage volume on the LNG carrier vessel can be optimized. The arrangement of the second type of LNG tank in the cargo hold frees up deck space that now can be used for processing equipment. Additionally, by providing an open space in the processing equipment with an opening in the main deck above the

30 second type LNG storage tank, the second type LNG storage tank can be accessed with tools such as pumping equipment and/or for maintenance purposes.

According to an aspect, the invention relates to a LNG carrier vessel as described above, wherein above each secondary cargo hold the main deck is arranged

as a reinforced deck, the reinforcement being arranged in correspondence with a load of the processing equipment on the main deck.

According to an aspect, the invention relates to a LNG carrier vessel as described above, wherein a third portion of the main deck above the one or more
5 secondary cargo holds is kept free from processing equipment.

According to an aspect, the invention relates to a LNG carrier vessel as described above, wherein the LNG carrier vessel comprises a crane at the second portion of the main deck area above the secondary cargo hold, the crane being arranged for transferring an LNG pumping device to/from the second type LNG storage tank
10 through the opening.

According to an aspect, the invention relates to a LNG carrier vessel as described above, wherein a weight of the second type LNG storage tank and a weight of the process equipment above the respective second type LNG storage tank is equal to or less than a weight of the first type LNG storage tank.

15 According to an aspect, the invention relates to a LNG carrier vessel as described above, wherein a payload of the second type LNG storage tank is less than a payload of the first type LNG storage tank.

According to an aspect, the invention relates to a LNG carrier vessel as described above, wherein the second-type tank is a tank-type selected from a group
20 comprising a prismatic shaped tank, a cylindrical tank, a bi-lobe cylindrical tank.

According to an aspect, the invention relates to a LNG carrier vessel as described above, wherein the LNG carrier vessel is provided with sponsons alongside the hull.

Also, the invention relates to a floating LNG plant comprising a first LNG
25 carrier vessel, a second LNG carrier vessel, a connection structure, and a mooring system for mooring the floating LNG plant to the seabed;
the connection structure being arranged for connecting a side wall of the hull of the first LNG carrier vessel and a side wall of the hull of the second LNG carrier vessel such that the hulls are adjacent to each other with the connection structure between the
30 respective hulls in order to obtain a twin-hull vessel, wherein at least the first LNG carrier is an LNG carrier vessel as described above.

According to an aspect, the invention relates to a floating LNG plant as described above, wherein the mooring system is provided with a turret for allowing the floating LNG plant to weathervane.

According to an aspect, the invention relates to a floating LNG plant as described above, wherein turret is placed external of each of the hulls of the first and second LNG carrier.

According to an aspect, the invention relates to a floating LNG plant as described above, wherein the connection structure comprises the sponsons alongside the hull of the first LNG carrier vessel.

According to an aspect, the invention relates to a floating LNG plant as described above, wherein the connection structure comprises a closed box structure in between the first and the second LNG carrier vessel.

According to an aspect, the invention relates to a floating LNG plant as described above, wherein the connection structure provides additional deck space between the hulls of the first and the second LNG carrier and wherein a further part of the process equipment is installed on the additional deck space provided by the connection structure.

According to an aspect, the invention relates to a floating LNG plant as described above, wherein the process equipment for LNG processing comprises means for liquefaction of natural gas.

Moreover, the invention relates to a method for manufacturing a LNG carrier vessel being provided with a hull, a main deck, a plurality of cargo holds below the main deck and LNG storage tanks, comprising:

- providing a prefabricated LNG carrier vessel provided with a plurality of first type LNG storage tanks in a corresponding number of cargo holds, the first-type LNG storage tank being a spherical type LNG tank arranged inside the hull with a portion of the spherical tank protruding above main deck;
- removing from a second number of the cargo holds the first type LNG storage tank and the main deck adjacent to the removed first type LNG storage tank, the second number being smaller than the plurality such that a first number of first type LNG storage tanks remains;
- installing in one or more of the second number of cargo holds a second type LNG storage tank that is not a spherical-type LNG tank;

- creating and reinforcing a main deck over the secondary cargo holds;
- installing process equipment for LNG processing on a first portion of the main deck area over the secondary cargo holds, with a second portion of the main deck area being free from processing equipment, and
- 5 -- if a second type LNG storage tank has been installed in a respective secondary cargo hold, providing an open space with an opening in the second portion of the main deck area above the second type LNG storage tank for access to the second type LNG storage tank.

According to an aspect, the invention relates to a method as described above,
10 wherein the removal of the first type LNG storage tank from the second number of the cargo holds comprises the step of maintaining the transverse bulkheads of the respective cargo holds.

According to an aspect, the invention relates to a method as described above,
wherein the installation of the second type LNG storage tank in one of the second
15 number of cargo holds comprises fitting the second type LNG storage tank between existing transverse bulkheads of the respective cargo hold.

According to an aspect, the invention relates to a method as described above,
wherein the installation of the second type LNG storage tank comprises installing reinforcements in the secondary cargo hold.

20 According to an aspect, the invention relates to a method as described above, comprising the step of joining the LNG carrier vessel with a second LNG carrier vessel by means of a connection structure, arranging the connection structure for connecting a side wall of the hull of the first LNG carrier vessel and a side wall of the hull of the second LNG carrier vessel such
25 that the hulls are adjacent to each other with the connection structure between the respective hulls in order to obtain a twin-hull vessel.

According to an aspect, the invention relates to a method as described above,
wherein the second LNG carrier vessel is manufactured in accordance with the method as described above.

30 Advantageous embodiments are further defined by the dependent claims.

Brief description of drawings.

The invention will be explained in more detail below with reference to drawings in which illustrative embodiments of the invention are shown.

Figure 1 shows a side view of an LNG carrier vessel according to the invention;

5 Figure 2 shows a top view of the LNG carrier vessel in accordance with an embodiment of the invention;

Figure 3 shows a cross-section of the hull of the LNG carrier vessel of figure 1 over a secondary cargo hold;

10 Figure 4 shows a top view of a floating LNG plant 1 according to an embodiment of the invention.

Detailed description of embodiments

Figure 1 shows a side view of an LNG carrier vessel 10 according to an embodiment of the invention.

15 The LNG carrier vessel 10 comprises a hull 14 and a main deck 16.

The LNG carrier vessel 10 is further provided with storage capacity for LNG by means of a plurality of LNG tanks 20, 22. The LNG tanks 20, 22 are mounted in the cargo holds of each of the carrier vessels.

20 The plurality of LNG tanks comprises one or more LNG tanks 20 of a first spherical type, that are arranged in the cargo holds C1 (indicated as primary cargo holds) within the hull 14 of the LNG carrier vessel 10. The spherical LNG tanks 20 are dimensioned in such a way that a portion of the sphere protrudes above the main deck 16.

Spherical LNG tanks are known from the prior art as Moss type LNG tanks.

25 According to the invention the LNG carrier vessel 10 further comprises one or more LNG tanks 22 of a second non-spherical type in one or more of the remaining cargo holds C2 (indicated as secondary cargo holds) of the LNG carrier vessel 10.

30 The second type LNG tank(s) 22 is (are) fitted into the secondary cargo hold(s) under a part of the main deck 16 such that each secondary cargo hold, either equipped with a second type LNG tank 22 or void of a second type LNG tank, is substantially covered with the main deck 16.

In this manner the part of the main deck 16 above each secondary cargo hold is substantially free and available as space for installing processing equipment for LNG processing. The processing equipment provides the LNG carrier vessel with production

capabilities for LNG, the processing equipment is schematically depicted by blocks 24, 26.

The arrangement and number of second type LNG storage tanks being installed is determined by on one hand the required deck space for LNG processing equipment and on the other hand by the weight of the second type LNG storage tank and the weight of the processing equipment in order to avoid insufficient buoyancy of the LNG carrier vessel 10.

Additionally, the weight of the payload of the second type LNG storage tank and the weight of the payload of the first type LNG spherical storage tank should be taken into account.

In case of a conversion of a prefabricated LNG carrier vessel 10 with a plurality of only first type LNG spherical tanks 20, where the conversion involves removal and replacement of one or more of the first type LNG storage tanks 20, the weight of the processing equipment 24, 26 installed above one cargo hold C2 and, if installed in the secondary cargo hold, the weight of a second type LNG storage tank 22 plus payload, should not exceed the weight and payload of a single first type LNG spherical storage tank 20.

Further in view of the weight of the processing equipment 24, 26, the main deck 16 on which the processing equipment is installed, is suitably reinforced.

Figure 2 shows a schematic top view of an LNG carrier vessel 10 according to figure 1.

The second type LNG storage tank 22 is installed in between the bulkheads 28 that border the respective cargo hold C2.

According to the embodiment, the area above the second type LNG storage tank 22 is not fully occupied by the processing equipment 24 but comprises an open space 30 with an opening 32 for access to the second type LNG storage tank 22 below the main deck 16.

It is noted that processing equipment 26 occupying the main deck area over a secondary cargo hold C2 void of a second type LNG storage tank, may cover the full area or may as well have an open space.

Such an opening 30 in the main deck 16 is configured for passage of an LNG pumping device (not shown) to/from the second type LNG storage tank through said opening.

The open space 30 on the main deck 16 is arranged to be accessed by a crane (not shown) that can transfer the LNG pumping device through the opening.

In the embodiment as shown, the open space 30 on the main deck 16 extends in longitudinal direction over the secondary cargo hold C2. This allows the crane to be
5 maneuverable in that direction.

Alternatively, the open space 30 may extend in a transverse direction of the vessel.

Optionally, the LNG carrier vessel 10 is provided with sponsons 34 alongside the hull 14. The use of sponsons provides additional deck space for processing
10 equipment.

In an embodiment, the processing equipment 24, 26 comprises a liquefaction system for liquefying of (components of) feed gas from a gas source (not shown).

In an embodiment, the LNG carrier vessel 10 is provided with a mooring system to moor the vessel at a given offshore location.

15 In a further embodiment, the mooring system is provided with a turret system for coupling with a mooring buoy (not shown) in a manner that the LNG carrier vessel can weathervane.

Figure 3 shows a cross-section of the hull 14 of the LNG carrier vessel 10 of figure 1 over a secondary cargo hold C2 that holds a second type LNG storage tank 22.

20 In this exemplary embodiment, a prismatic LNG storage tank is installed in the secondary cargo hold C2. The prismatic LNG storage tank is positioned with a bottom portion on the floor 41 of the cargo hold in between corner brackets 42, 43 and with the storage tank's side walls adjacent to the side walls 44, 45 of the hull 14.

Above the main deck 16, the processing equipment 24, 26 is installed with an
25 intermediate open space 30 above the access opening 32 in the secondary cargo hold C2.

In an embodiment, alternative to the prismatic shaped LNG storage tank, the second type LNG storage tank 22 could be one of for example a cylindrical tank or a bi-lobe cylindrical tank.

30 In an embodiment, the second type LNG storage tank is provided with a boil-off dome (not shown) in the top part of the storage tank, which dome has an outlet (not shown) outside of the secondary cargo hold C2 above the main deck 16.

In an embodiment, gas boiling-off can be supplied to the processing equipment 24, 26 for example to a heat exchanger, a gas compressor or a gas engine (not shown).

Figure 4 shows a top view of a floating LNG plant 1 according to an embodiment of the invention.

5 The floating LNG plant 1 comprises a first and a second LNG carrier vessel 10, 11 and a connection structure 12.

 The first and second LNG carrier vessels that each comprise a hull 14 and a main deck 16, are arranged and coupled alongside each other by the connection structure 12. The connection structure 12 extends between the LNG carrier vessels 10, 11 in the longitudinal direction of the vessels.

 At least one of the LNG carrier vessels 10, 11 is further provided with storage capacity for LNG by means of first type LNG storage tanks 20, and second type LNG storage tanks 22 as described above with reference to figures 1 - 3. As described above, processing equipment on said LNG carrier vessel provides capacity for LNG production.

 The LNG tanks 20, 22 are mounted in the cargo holds C1; C2 of the carrier vessels as explained above.

 In an embodiment, the floating LNG plant 1 is provided with a mooring system 18 to moor the floating LNG plant at a given offshore location.

20 In a further embodiment, the mooring system 18 is provided with a turret system for coupling with a mooring buoy (not shown) in a manner that the floating LNG plant can weathervane.

 In yet a further embodiment, the mooring buoy comprises one or more risers (not shown) that are coupled to a subsea well or gas source and the mooring system 18 is arranged to couple the riser(s) to the processing equipment 24, 26 on the floating LNG plant 1.

 The connection structure 12 between the hulls of the first and second LNG carrier vessels can be one of a sponson construction 34 and a closed box structure.

30 The present invention also relates to a method for manufacturing a LNG carrier vessel 10 as described above or a floating LNG plant 1.

The method encompasses newly building an LNG carrier vessel 10 or a floating LNG plant 1 but also converting existing floating LNG plants or existing LNG carrier vessels 10; 11 that are arranged with spherical LNG storage tanks 20.

In a newly built floating LNG plant 1 i.e., based on newly built LNG carriers 5 10, LNG storage tanks of first and second type 20; 22 are arranged as desired on the LNG carrier vessel 10 or on at least one of the LNG carrier vessels 10, 11 that make up the floating LNG plant 1 according to the present invention.

In a conversion process, an existing LNG carrier vessel 10 or an existing floating LNG plant 1 (or a floating LNG plant to be built from existing LNG carrier 10 vessels) is converted by: removing one or more first type LNG storage tanks 20 from the cargo hold C1 in the hull 14 of the LNG carrier vessel(s) 10, 11; next adapting the cargo hold as secondary cargo hold C2 for accommodating one or more second type LNG storage tanks 22 and subsequently installing said second type LNG storage tank(s) 22 in the adapted secondary cargo hold C2.

15 At the location of the secondary cargo hold(s) C2, a reinforced main deck 16 is created and arranged with processing equipment 24, 28 for LNG processing.

In an embodiment, at said location an additional processing deck is arranged above the main deck 16 for accommodating the processing equipment.

According to an aspect, the method for the manufacture of a floating LNG plant 20 1 comprising the LNG carrier vessel 10, a second LNG carrier vessel 11, a connection structure 12, and a mooring system 18 for mooring the floating LNG plant to the seabed; each of the LNG carrier vessels 10, 11 being provided with a hull 14, a main deck 16, cargo holds C1, C2 below the main deck 16 and one or more first type spherical LNG storage tanks 20 arranged inside the respective hull with a portion of the 25 spherical tank protruding above the main deck comprises :

- connecting an external side wall of the hull 14 of the LNG carrier vessel 10 and an external side wall of the hull 14 of the second LNG carrier vessel 11 such that the hulls are adjacent to each other with the connection structure 12 between the respective hulls, in order to create a twin-hull vessel;
- 30 • providing at least the LNG carrier 10 in at least one secondary cargo hold C2 under a part of the main deck 16 with one or more second-type LNG storage tanks 22, the second-type LNG storage tank 22 not being a spherical-type LNG storage tank, and
- installing process equipment 24, 26 for LNG processing on-board the floating LNG

plant 1 at least arranged on the main deck 16 of the LNG carrier 10 with at least a part of the process equipment being arranged above a part of the main deck above the secondary cargo hold C2 holding the second-type LNG storage tank 22.

5 The invention can be further defined in accordance with the following clauses:

Clause 1. LNG carrier vessel being provided with a hull, a main deck, a plurality of cargo holds below the main deck, and LNG storage tanks, wherein - a first number of the cargo holds are configured as primary cargo holds that each comprise a first type LNG storage tank arranged as a spherical type LNG tank
10 inside the hull with a portion of the spherical tank protruding above the main deck;
- a second number of the cargo holds configured as secondary cargo holds that each either are void of an LNG storage tank or comprise a second type LNG storage tank that is not a spherical-type LNG tank and fits into the respective cargo hold;
the sum of the first number and second number being equal to the plurality;
15 - a first portion of an area of the main deck above the secondary cargo holds is provided with process equipment for LNG processing;
- and if the respective second cargo hold is equipped with a second type LNG storage tank, a second portion of the area of the main deck above the secondary cargo holds is free from processing equipment and comprises an opening for access to the second type
20 LNG storage tank in the respective secondary cargo hold.

Clause 2. LNG carrier vessel according to Clause 1, wherein above each secondary cargo hold the main deck is arranged as a reinforced deck, the reinforcement being arranged in correspondence with a load of the processing equipment on the main deck.

25 Clause 3. LNG carrier vessel according to Clause 1 or Clause 2, wherein a third portion of the main deck above the one or more secondary cargo holds is kept free from processing equipment.

Clause 4. LNG carrier vessel according to any one of preceding Clauses 1 - 3, wherein the LNG carrier vessel comprises a crane at the second portion of the main
30 deck area above the secondary cargo hold, the crane being arranged for transferring an LNG pumping device to/from the second type LNG storage tank through the opening.

Clause 5. LNG carrier vessel according to any one of Clauses 1 - 4, wherein a weight of the second type LNG storage tank and a weight of the process

equipment above the respective second type LNG storage tank is equal to or less than a weight of the first type LNG storage tank.

Clause 6. LNG carrier vessel according to Clause 5, wherein a payload of the second type LNG storage tank is less than a payload of the first type LNG storage tank.

Clause 7. LNG carrier vessel according to any one of the preceding Clauses 1 – 6, wherein the second-type tank is a tank-type selected from a group comprising a prismatic shaped tank, a cylindrical tank, a bi-lobe cylindrical tank.

Clause 8. LNG carrier vessel according to any one of the preceding Clauses 1 – 7, wherein the LNG carrier vessel is provided with sponsons alongside the hull.

Clause 9. Floating LNG plant comprising a first LNG carrier vessel, a second LNG carrier vessel, a connection structure, and a mooring system for mooring the floating LNG plant to the seabed; the connection structure being arranged for connecting a side wall of the hull of the first LNG carrier vessel and a side wall of the hull of the second LNG carrier vessel such that the hulls are adjacent to each other with the connection structure between the respective hulls in order to obtain a twin-hull vessel, wherein at least the first LNG carrier is an LNG carrier vessel in accordance with any one of the preceding Clauses 1 – 8.

Clause 10. Floating LNG plant according to Clause 9, wherein the mooring system is provided with a turret for allowing the floating LNG plant to weathervane.

Clause 11. Floating LNG plant according to Clause 10, wherein the turret is placed external of each of the hulls of the first and second LNG carrier.

Clause 12. Floating LNG plant according to Clause 9, wherein the connection structure comprises the sponsons alongside the hull of the first LNG carrier vessel.

Clause 13. Floating LNG plant according to Clause 9, wherein the connection structure comprises a closed box structure in between the first and the second LNG carrier vessel.

Clause 14. Floating LNG plant according to Clause 12 or Clause 13, wherein the connection structure provides additional deck space between the hulls of the first and the second LNG carrier and wherein a further part of the process equipment is installed on the additional deck space provided by the connection structure.

Clause 15. Floating LNG plant according to any one of the preceding Clauses 9 - 14, wherein the process equipment for LNG processing comprises means for liquefaction of natural gas.

- Clause 16. Method for manufacturing a LNG carrier vessel being provided
- 5 with a hull, a main deck, a plurality of cargo holds below the main deck and LNG storage tanks, comprising:
- providing a prefabricated LNG carrier vessel provided with a plurality of first type LNG storage tanks in a corresponding number of cargo holds, the first-type LNG storage tank being a spherical type LNG tank arranged inside the hull with a portion of
 - 10 the spherical tank protruding above main deck;
 - removing from a second number of the cargo holds the first type LNG storage tank and the main deck adjacent to the removed first type LNG storage tank, the second number being smaller than the plurality such that a first number of first type LNG storage tanks remains;
 - 15 -- installing in one or more of the second number of cargo holds a second type LNG storage tank that is not a spherical-type LNG tank;
 - creating and reinforcing a main deck over the secondary cargo holds;
 - installing process equipment for LNG processing on a first portion of the main deck area over the secondary cargo holds, with a second portion of the main deck area being
 - 20 free from processing equipment, and
 - if a second type LNG storage tank has been installed in a respective secondary cargo hold, providing an opening in the second portion of the main deck area above the second type LNG storage tank for access to the second type LNG storage tank.

- Clause 17. Method according to Clause 16, wherein the removal of the first
- 25 type LNG storage tank from the second number of the cargo holds comprises the step of maintaining the transverse bulkheads of the respective cargo holds.

- Clause 18. Method according to Clause 16 or Clause 17, wherein the installation of the second type LNG storage tank in one of the second number of cargo holds comprises fitting the second type LNG storage tank between existing transverse
- 30 bulkheads of the respective cargo hold.

Clause 19. Method according to Clause 18, wherein the installation of the second type LNG storage tank comprises installing reinforcements in the secondary cargo hold.

Clause 20. Method according to any one of Clauses 16 – 19, comprising the step of joining the LNG carrier vessel with a second LNG carrier vessel by means of a connection structure, arranging the connection structure for connecting a side wall of the hull of the first LNG carrier vessel and a side wall of the hull of the second LNG carrier vessel such that the hulls are adjacent to each other with the connection structure between the respective hulls in order to obtain a twin-hull vessel.

Clause 21. Method according to Clause 20, wherein the second LNG carrier vessel is manufactured in accordance with the method of any one of Clauses 16 – 19.

10 The invention has been described with reference to some embodiments. It will be appreciated by the person skilled in the art that other alternative and equivalent embodiments of the invention can be conceived and reduced to practice without departing from the invention. It is intended that the invention be construed as including all such modifications and alterations insofar as they come within the scope of the
15 appended claims.

Claims

1. An LNG carrier vessel being provided with a hull, a main deck, a plurality of cargo holds below the main deck, and LNG storage tanks,
5 wherein
 - a first number of the cargo holds are configured as primary cargo holds that each comprise a first type LNG storage tank arranged as a spherical type LNG tank inside the hull with a portion of the spherical tank protruding above the main deck;
 - a second number of the cargo holds configured as secondary cargo holds that each
10 either are void of an LNG storage tank or comprise a second type LNG storage tank that is not a spherical-type LNG tank and fits into the respective cargo hold; the sum of the first number and second number being equal to the plurality;
 - a first portion of an area of the main deck above the secondary cargo holds is provided with process equipment for LNG processing;
 - 15 - and if the respective second cargo hold is equipped with a second type LNG storage tank, a second portion of the area of the main deck above the secondary cargo holds is free from processing equipment and comprises an open space with an opening for access to the second type LNG storage tank in the respective secondary cargo hold.
- 20 2. The LNG carrier vessel according to Claim 1, wherein above each secondary cargo hold the main deck is arranged as a reinforced deck, the reinforcement being arranged in correspondence with a load of the processing equipment on the main deck.
3. The LNG carrier vessel according to Claim 1 or Claim 2, wherein a third
25 portion of the main deck above the one or more secondary cargo holds is kept free from processing equipment.
4. The LNG carrier vessel according to any one of the preceding Claims 1 – 3, wherein the LNG carrier vessel comprises a crane at the second portion of the main
30 deck area above the secondary cargo hold, the crane being arranged for transferring an LNG pumping device to/from the second type LNG storage tank through the opening.

5. The LNG carrier vessel according to any one of the preceding Claims 1 – 4, wherein a weight of the second type LNG storage tank and a weight of the process equipment above the respective second type LNG storage tank is equal to or less than a weight of the first type LNG storage tank.

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6. The LNG carrier vessel according to Claim 5, wherein a payload of the second type LNG storage tank is less than a payload of the first type LNG storage tank.

7. The LNG carrier vessel according to any one of the preceding Claims 1 – 6,
10 wherein the second-type tank is a tank-type selected from a group comprising a prismatic shaped tank, a cylindrical tank, a bi-lobe cylindrical tank.

8. The LNG carrier vessel according to any one of the preceding Claims 1 – 7,
wherein the LNG carrier vessel is provided with sponsons alongside the hull.

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9. A floating LNG plant comprising a first LNG carrier vessel, a second LNG carrier vessel, a connection structure, and a mooring system for mooring the floating LNG plant to the seabed;
the connection structure being arranged for connecting a side wall of the hull of the first
20 LNG carrier vessel and a side wall of the hull of the second LNG carrier vessel such that the hulls are adjacent to each other with the connection structure between the respective hulls in order to obtain a twin-hull vessel,
wherein at least the first LNG carrier is an LNG carrier vessel in accordance with any one of the preceding Claims 1 – 8.

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10. The floating LNG plant according to Claim 9, wherein the mooring system is provided with a turret for allowing the floating LNG plant to weathervane.

11. The floating LNG plant according to Claim 10, wherein the turret is placed
30 external of each of the hulls of the first and second LNG carrier.

12. The floating LNG plant according to Claim 9, wherein the connection structure comprises the sponsons alongside the hull of the first LNG carrier vessel.
13. The floating LNG plant according to Claim 9, wherein the connection structure
5 comprises a closed box structure in between the first and the second LNG carrier vessel.
14. The floating LNG plant according to Claim 12 or 13, wherein the connection structure provides additional deck space between the hulls of the first and the second
10 LNG carrier and wherein a further part of the process equipment is installed on the additional deck space provided by the connection structure.
15. The floating LNG plant according to any one of the preceding Claims 9 – 14, wherein the process equipment for LNG processing comprises means for liquefaction
15 of natural gas.
16. A method for manufacturing a LNG carrier vessel being provided with a hull, a main deck, a plurality of cargo holds below the main deck and LNG storage tanks, comprising:
- 20 -- providing a prefabricated LNG carrier vessel provided with a plurality of first type LNG storage tanks in a corresponding number of cargo holds, the first-type LNG storage tank being a spherical type LNG tank arranged inside the hull with a portion of the spherical tank protruding above main deck;
- removing from a second number of the cargo holds the first type LNG storage tank
25 and the main deck adjacent to the removed first type LNG storage tank, the second number being smaller than the plurality such that a first number of first type LNG storage tanks remains;
- installing in one or more of the second number of cargo holds a second type LNG storage tank that is not a spherical-type LNG tank;
- 30 -- creating and reinforcing a main deck over the secondary cargo holds;
- installing process equipment for LNG processing on a first portion of the main deck area over the secondary cargo holds, with a second portion of the main deck area being free from processing equipment, and

-- if a second type LNG storage tank has been installed in a respective secondary cargo hold, providing an open space with an opening in the second portion of the main deck area above the second type LNG storage tank for access to the second type LNG storage tank.

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17. The method according to Claim 16, wherein the removal of the first type LNG storage tank from the second number of the cargo holds comprises the step of maintaining the transverse bulkheads of the respective cargo holds.

10 18. The method according to Claim 16 or Claim 17, wherein the installation of the second type LNG storage tank in one of the second number of cargo holds comprises fitting the second type LNG storage tank between existing transverse bulkheads of the respective cargo hold.

15 19. The method according to Claim 18, wherein the installation of the second type LNG storage tank comprises installing reinforcements in the secondary cargo hold.

20 20. The method according to any one of the preceding Claims 16 – 19, comprising the step of joining the LNG carrier vessel with a second LNG carrier vessel by means of a connection structure,
arranging the connection structure for connecting a side wall of the hull of the first LNG carrier vessel and a side wall of the hull of the second LNG carrier vessel such that the hulls are adjacent to each other with the connection structure between the respective hulls in order to obtain a twin-hull vessel.

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21. The method according to Claim 20, wherein the second LNG carrier vessel is manufactured in accordance with the method of any one of the preceding Claims 16 – 19.

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