CLAIMS

【Claim 1】

A boil-off gas (BOG) reliquefaction method for LNG ships, comprising:

compressing BOG;

cooling a hot fluid corresponding to compressed BOG used as the reliquefaction target through heat exchange between the hot fluid and a cold fluid corresponding to non-compressed BOG used as the refrigerantusing a heat exchanger; and

expanding the cooled BOG, wherein the heat exchanger comprises a core in which heat exchange between the hot fluid and the cold fluid occurs, the core comprising a plurality of diffusion blocks, and

cooling the hot fluid comprises diffusing the hot fluid and/or the cold fluid introduced into the core to maintain reliquefaction performance regardless of change in flow rate of the hot fluid and/or cold fluid.

【Claim 2】

The BOG reliquefaction method for LNG ships according to claim 1, wherein the reliquefaction performance is stably maintained even when the heat exchanger has a heat capacity ratio of 0.7 to 1.2.

【Claim 3】

The BOG reliquefaction method for LNG ships according to claim 1, wherein an amount of the BOG reliquefied is maintained at 50% or more of an HYSYS calculation value.

【Claim 4】

The BOG reliquefaction method for LNG ships according to claim 1, wherein the LNG ship is operated at a speed of 10 to 17 knots.

【Claim 5】

The BOG reliquefaction method for LNG ships according to claim 1, wherein some fraction of the compressed BOG is used as fuel of an engine, and a flow rate of the BOG used as the fuel of the engine is in the range of 1,100 kg/h to 2,660 kg/h.

【Claim 6】

The BOG reliquefaction method for LNG ships according to claim 1, wherein the flow rate of the BOG to be used as the reliquefaction target is in the range of 1,900 kg/h to 3,300 kg/h.

【Claim 7】

The BOG reliquefaction method for LNG ships according to claim 1, wherein a ratio of the flow rate of the BOG to be used as the reliquefaction target to the flow rate of BOG used as the refrigerant for heat exchange in cooling the hot fluid is in the range of 0.42 to 0.72.

【Claim 8】

A boil-off gas (BOG) reliquefaction system for LNG ships, comprising:

a compressor compressing BOG;

a heat exchanger cooling a hot fluid corresponding to the compressed BOG through heat exchange between the hot fluid and a cold fluid corresponding to non-compressed BOG; and

an expansion unit expanding the fluid cooled by the heat exchanger,

wherein the heat exchanger comprises:

a core in which heat exchange between the hot fluid and the cold fluid occurs, the core comprising a plurality of diffusion blocks; and

a fluid diffusion means diffusing a fluid introduced into the core or a fluid discharged from the core, and

reliquefaction performance is maintained by the fluid diffusion means regardless of change in flow rate of the hot fluid and/or the cold fluid.

【Claim 9】

The BOG reliquefaction system for LNG ships according to claim 8, wherein the fluid diffusion means resists the hot fluid and/or the cold fluid to diffuse the fluid.

【Claim 10】

The BOG reliquefaction system for LNG ships according to claim 9, wherein the fluid diffusion means is coupled to the heat exchanger to enable release of thermal expansion and contraction.

【Claim 11】

The BOG reliquefaction system for LNG ships according to claim 9, wherein the fluid diffusion means is a perforated plate.

【Claim 12】

The BOG reliquefaction system for LNG ships according to claim 11, wherein the perforated plate is formed with one or more holes, the holes having cross-sectional areas increasing with increasing distance from a pipe through which the hot fluid and/or the cold fluid is introduced or discharged.

【Claim 13】

The BOG reliquefaction system for LNG ships according to claim 11, wherein the perforated plate is formed with one or more holes, the holes having a density increasing with increasing distance from a pipe through which the hot fluid and/or the cold fluid is introduced or discharged.

【Claim 14】

The BOG reliquefaction system for LNG ships according to claim 11, wherein the heat exchanger comprises at least one partition, the partition being disposed between the perforated plate and the core to prevent the fluid having been diffused by the perforated plate

from being combined again.

【Claim 15】

The BOG reliquefaction system for LNG ships according to claim 14, wherein the partition divides an inner space into a plurality of regions.

【Claim 16】

The BOG reliquefaction system for LNG ships according to claim 8, wherein a flow rate of fluid supplied to each of the plurality of diffusion blocks is less than 4 times a flow rate of fluid discharged from each of the plurality of diffusion blocks.

【Claim 17】

The BOG reliquefaction system for LNG ships according to claim 10, wherein the heat exchanger comprises a plurality of support members separated at constant intervals from each other and coupled to the heat exchanger, and the fluid diffusion means is fitted between the support members separated from each other.

【Claim 18】

The BOG reliquefaction system for LNG ships according to claim 17, wherein the fluid diffusion means extends at both ends thereof parallel to the core and is stepped away from the core.

【Claim 19】

The BOG reliquefaction system for LNG ships according to claim 10, wherein the fluid diffusion means is a fluid diffusion channel formed in each of the diffusion blocks.

【Claim 20】

The BOG reliquefaction system for LNG ships according to claim 19, wherein the fluid diffusion channel has a smaller cross-sectional area at an entrance thereof through which

the fluid enters the fluid diffusion channel than other portions thereof.