CLAIMS

1. Semi-submersible vessel for offshore operations which is suitable to be operated in icy waters and in ice-free waters, said vessel comprising:
   - an operating deck to accommodate equipment;
   - at least one lower hull;
   - an essentially vertical connecting structure between the at least one lower hull and the operating deck;
   - a ballast system to ballast or deballast the vessel;

   wherein the connecting structure has a water portion and an icebreaking portion being arranged on top of each other,
   wherein the vessel is configured to have an icebreaking draft for icy waters in which the water- or iceline is substantially level with the icebreaking portion, and a water draft for ice-free waters in which the waterline is substantially level with the water portion,
   wherein the icebreaking portion has a single closed tapered contour,
   wherein during the water draft the collective area of the water portion of the connecting structure intersecting the water surface is smaller than the collective area of the icebreaking portion of the connecting structure intersecting the water surface during the icebreaking draft,
   wherein the icebreaking portion is located between the water portion and the operating deck,
   wherein the water portion of the connecting structure is formed by multiple columns,
   and wherein the columns extend from the lower hull obliquely inwards towards a centre of the vessel.

2. Semi-submersible vessel according to one or more of the preceding claims, wherein the icebreaking portion is essentially circular, and preferably has a single closed contour.

3. Semi-submersible vessel according to one or more of the preceding claims, wherein the vessel comprises at least one lower deck below the operating deck which at least one lower deck is integrated in the icebreaking portion.

4. Semi-submersible vessel according to one or more of the preceding claims, comprising a subsea drilling installation and a moonpool through the one or more decks through which drilling operations can be performed.

5. Semi-submersible vessel according to one or more of the preceding claims, wherein the water portion has one or more openings provided with a net or mesh structure to prevent ice from entering a central space in the water portion via the one or more openings.

6. Semi-submersible vessel according to claim 5, wherein the net or mesh structure is configured to be used as heating and/or cooling element.

7. Semi-submersible vessel according to claim 4, further comprising a protective wall (36) extending downwards from the vessel in a central space around the moonpool as protection of the drilling equipment extending through the moonpool against ice that has entered the central space, wherein preferably the protective wall extends to below the water draft.

8. Semi-submersible vessel according to one or more of the preceding claims, wherein additional openings or through holes extend through the operating deck up until a central space below the operating deck, so that air is able to flow between the central space and the surroundings of the vessel via the openings or through holes, and wherein preferably the openings or through holes are provided with respective valves (55) to allow the controlled opening or closing of the openings or through holes.

9. Semi-submersible vessel according to one or more of the preceding claims, wherein the area of the connecting structure being intersected by the water surface during the water draft in water draft conditions comprises multiple separate cross-sections corresponding to the respective multiple columns, wherein the multiple separate cross-sections are placed in a circular manner to define a circumscribed circle and an inscribed circle together forming a ring shape, wherein the collective area of the multiple separate cross-sections being intersected by the water surface in water draft is between 50% and 70%, preferably 60%, of the total area of the ring shape, and wherein preferably the water portion comprises eight columns.

10. Semi-submersible vessel according to one or more of the preceding claims, wherein the lower hull is ring-shaped with an opening, and wherein the opening in

the lower hull and/or openings in between the multiple columns are adjustable during operation.

11. Method for operating a semi-submersible vessel according to one or more of the claims 1-10, wherein the ballast system is operated to change the draft of the semi-submersible to the water draft when the semi-submersible is in ice-free waters, and wherein the ballast system is operated to change the draft of the semi-submersible to the icebreaking draft when the semi-submersible is in icy waters.

CLAIMS

1. Semi-submersible vessel for offshore operations which is suitable to be operated in icy waters and in ice-free waters, said vessel comprising:
   - an operating deck to accommodate equipment;
   - at least one lower hull;
   - an essentially vertical connecting structure between the at least one lower hull and the operating deck;
   - a ballast system to ballast or deballast the vessel;

   wherein the connecting structure has a water portion and an icebreaking portion being arranged on top of each other,
   wherein the vessel is configured to have an icebreaking draft for icy waters in which the water- or iceline is substantially level with the icebreaking portion, and a water draft for ice-free waters in which the waterline is substantially level with the water portion,
   wherein the icebreaking portion has a single closed tapered contour,
   wherein during the water draft the collective area of the water portion of the connecting structure intersecting the water surface is smaller than the collective area of the icebreaking portion of the connecting structure intersecting the water surface during the icebreaking draft,
   wherein the icebreaking portion is located between the water portion and the operating deck,
   wherein the water portion of the connecting structure is formed by multiple columns,
   and wherein the columns extend from the lower hull obliquely inwards towards a centre of the vessel.

2. Semi-submersible vessel according to claim 1, wherein the icebreaking portion is essentially circular, and preferably has a single closed contour.

3. Semi-submersible vessel according to one or more of the preceding claims, wherein the vessel comprises at least one lower deck below the operating deck which at least one lower deck is integrated in the icebreaking portion.

4. Semi-submersible vessel according to one or more of the preceding claims, comprising a subsea drilling installation and a moonpool through the one or more decks through which drilling operations can be performed.

5. Semi-submersible vessel according to one or more of the preceding claims, wherein the water portion has one or more openings provided with a net or mesh structure to prevent ice from entering a central space in the water portion via the one or more openings.

6. Semi-submersible vessel according to claim 5, wherein the net or mesh structure is configured to be used as heating and/or cooling element.

7. Semi-submersible vessel according to claim 4, further comprising a protective wall (36) extending downwards from the vessel in a central space around the moonpool as protection of the drilling equipment extending through the moonpool against ice that has entered the central space, wherein preferably the protective wall extends to below the water draft.

8. Semi-submersible vessel according to one or more of the preceding claims, wherein additional openings or through holes extend through the operating deck up until a central space below the operating deck, so that air is able to flow between the central space and the surroundings of the vessel via the openings or through holes, and wherein preferably the openings or through holes are provided with respective valves (55) to allow the controlled opening or closing of the openings or through holes.

9. Semi-submersible vessel according to one or more of the preceding claims, wherein the area of the connecting structure being intersected by the water surface during the water draft in water draft conditions comprises multiple separate cross-sections corresponding to the respective multiple columns, wherein the multiple separate cross-sections are placed in a circular manner to define a circumscribed circle and an inscribed circle together forming a ring shape, wherein the collective area of the multiple separate cross-sections being intersected by the water surface in water draft is between 50% and 70%, preferably 60%, of the total area of the ring shape, and wherein preferably the water portion comprises eight columns.

10. Semi-submersible vessel according to one or more of the preceding claims, wherein the lower hull is ring-shaped with an opening, and wherein the opening in

the lower hull and/or openings in between the multiple columns are adjustable during operation.

11. Method for operating a semi-submersible vessel according to one or more of the claims 1-10, wherein the ballast system is operated to change the draft of the semi-submersible to the water draft when the semi-submersible is in ice-free waters, and wherein the ballast system is operated to change the draft of the semi-submersible to the icebreaking draft when the semi-submersible is in icy waters.