Claims

1. A shallow water seabed terminal (40) for storing and loading or unloading hydrocarbons, such as LNG, oil or gas, comprising a floatable, removable module (20), and a removable seabed substructure (10) intended to be supported by a seabed (19), the floatable module (20) being releasably fixed to the seabed substructure (10) so that a harbour terminal is formed, the seabed substructure (10) comprises a base structure (11) provided with buoyancy devices, an upwards extending wall structure (12) extending up from the base structure (11) and arranged along at least a part of the periphery of the base structure (11), the base structure also being provided with an opening (18) in the wall structure (12) for allowing the floatable module (20), to be berthed in and supported by the seabed substructure (10),
characterized in that the base structure (11) is provided with a submerged beam or base slab structure (35) extending laterally out from the vertical wall structure (12), configured to support the floatable, removable module, the beam or slab structure (35) being provided with sleeves or ducts extending through the submerged beam or slab structure (35) configured to receive piles to be driven down into seabed soil.

2. A seabed terminal (40) according to claim 1, wherein a pile head is intended to be terminated below sea level (37), preferably flush with an upper surface of the beam or slab structure (35).

3. A seabed terminal (40) according to claim 1 or 2, wherein the sleeves or ducts form an angle α with the vertical, securing piles in an inclined position when piled.

4. A seabed terminal (40) according to claim 1 or 2, wherein an underside of the base structure (11) has no load bearing contact with the seabed soil (19) and variable, operational and environmental loads of the sea terminal are taken up by the piles.

5. A seabed terminal (40) according to any one of claims 1 to 3, wherein the base structure (11) is a jacket frame structure.

6. A seabed terminal (40) according to any one of claims 1 to 4, wherein the wall structure (12) is an integrated part of the base structure (11) forming a seabed substructure (10) unit.

7. A seabed terminal (40) according to any one of claims 1 to 5, wherein the seabed substructure (10) has means for ballasting.

8. A seabed terminal (40) according to any one of claims 1 to 6, wherein at least parts of the wall structure (12) extend above a water surface.

9. A seabed terminal (40) according to any one of claims 1 to 7, wherein the seabed substructure (10) also has means for piling the wall structure (12) extending from the top of the wall structure (12) through the bottom of the wall structure (12).

10. A seabed terminal (40) according to any one of claims 1 to 8, wherein the opening (18) in the wall structure (12) for introducing the floatable module (20) is closable with a closing mechanism forming a closed wall structure (12) at the periphery of the base structure (11).

11. A seabed terminal according to any one of claims 1 to 9, wherein the ducts or sleeves are provided with sealing devices at an lower end, preventing grout to escape downwards.

12. A seabed terminal according to any one of claims 1 to 10, wherein an inner surface of the ducts or sleeves is provided with spacers, preferably at an upper end and a lower end, configured to prevent the pile to come into direct contact with an inner duct or sleeve wall, thereby establishing an annulus for filling of grout.

13. A seabed terminal according to any one of claims 1 to 11, wherein an inner surface of the ducts or sleeves is provided with a number of shear providing devices, securing proper shear and adhesion between an inner wall surface of the ducts or sleeves and an external wall surface of the pile.

14. A seabed terminal (40) according to any one of claims 1 to 13, wherein the base structure (11) is divided into the same number of bulkheads as the module (20)

and that vertical walls of the bulkheads form a structural beam so that vertical forces of the storage module (20) are transferred directly into the structural beam of the base structure (11).

15. A seabed terminal (40) according to any one of claims 1 to 14, wherein the floatable module (20) is locked to the base structure (11) by a mechanical locking device or by welding shear force plates to the seabed substructure (10).