

Claims

[Claim 1] A sealed and thermally insulating tank (71) incorporated in a supporting structure (2), the tank including at least one inclined tank wall (1) forming an angle with a horizontal direction and fixed to a supporting wall of the supporting structure (2), the inclined tank wall (1) having a multilayer structure including successively, in the direction of the thickness (52) from the outside to the inside of the tank, a thermally insulating barrier (3) held against the corresponding supporting wall and a sealed membrane (4) carried by the thermally insulating barrier (3), the tank comprising sealed or substantially sealed strips (15) in the space formed between the thermally insulating barrier (3) and the supporting wall, wherein the sealed or substantially sealed strips (15) segment the space between the thermally insulating barrier (3) and the supporting wall in a plurality of successive zones (14) in a direction of greatest slope (51) of the inclined tank wall (1), the zones (14) extending over an entire transverse dimension of the inclined tank wall (1) in a transverse direction (50) inclined relative to the direction of greatest slope, _____
in which the sealed or substantially sealed strips (15) comprise at least one substantially sealed strip which is traversed by a high head loss communication channel (17) so that the zones (14) separated by said at least one substantially sealed strip are in slow fluidic communication enabling the pressure to be balanced between the zones (14) separated by said at least one substantially sealed strip without allowing significant convective flow.

[Claim 2] The tank as claimed in Claim 1, in which at least one of the sealed or substantially sealed strips (15) is extended over all the transverse dimension of the inclined tank wall (1).

[Claim 3] The tank as claimed in claim 1 or claim 2, in which at least one of the sealed or substantially sealed strips is formed of a polymer material, for example a mastic or a closed cell foam, for example a closed cell polyurethane foam, or the combination of an EPDM rubber strip with a polyester foam strip.

[Claim 4] The tank as claimed in any one of claims 1 to 3, in which at least one of the sealed or substantially sealed strips (15) includes a plurality of strip portions (16) connected to one another in sealed manner by at least one fishplate (18), the fishplate (18) being disposed between two adjacent strip portions (16).

[Claim 5] The tank as claimed in Claim 4, in which the plurality of strip portions (16) comprise a first strip portion and a second strip portion (16), the second strip portion (16) being adjacent to the first strip portion (16), the fishplate (18) ~~has~~having a first end situated in ~~the~~a first strip portion (16) and a second end situated in ~~the~~a second strip portion (16), ~~the second strip portion (16) being adjacent to the first strip portion (16).~~

[Claim 6] The tank as claimed in Claim 4 or Claim 5, in which the thermally insulating barrier (3) comprises a plurality of insulating blocks (5) juxtaposed to one another in the direction of greatest slope and in the transverse direction, at least one of the sealed or substantially sealed strips (15) being interrupted at the level of an interface or an interstice between two adjacent insulating blocks (5), the fishplate (18) being disposed between two adjacent insulating blocks (5) so as to connect two adjacent strip portions (16) in sealed manner.

~~[Claim 7] The tank as claimed in any one of claims 1 to 6, in which at least one of the substantially sealed strips (15) is traversed by a high head loss communication channel (17) so that the zones (14) separated by said at least one substantially sealed strip (15) are in slow fluidic communication enabling the pressure to be balanced between the two zones without allowing significant convective flow.~~

~~[Claim 8]~~ [Claim 7] The tank as claimed ~~in claim 1 or claim 2~~ in Claim 7, in which the sealed or substantially sealed strips (15) comprise a plurality of substantially sealed strips, each substantially sealed strip being traversed by a high head loss communication channel (17) and each zone (14) is being in fluidic communication with an adjacent zone (14) via at least one high head loss communication channel (17).

~~[Claim 9]~~ [Claim 8] The tank as claimed in ~~Claim 7 or Claim 8~~ any one of claims 1 to 7, in which the head loss of a communication channel (17) is greater than or equal to

$$\Delta P = \frac{P_G}{n - 1}$$

, where ΔP is the minimum head loss of the communication channel, P_G the driving pressure of the gas situated in the space between the thermally insulating barrier (3) and the supporting structure (2) of the inclined tank wall (1) under normal conditions of use of the tank, and n representing the number of zones (14) segmented by the substantially sealed strips (15).

~~[Claim 10]~~ [Claim 9] ____ The tank as claimed in Claim ~~8~~ 9, in which the high head loss communication channel (17) includes a porous material filling the communication channel (17), the porous material having a porosity configured to result in a head loss greater than or equal to the minimum head loss ΔP .

~~[Claim 11]~~ [Claim 10] ____ The tank as claimed in Claim ~~9~~ 10, in which the porous material of the communication channel is chosen from melamine foam, open cell polyurethane (PU) foam and fiber braids.

~~[Claim 12]~~ [Claim 11] ____ The tank as claimed in any one of claims ~~17~~ 17 to ~~101~~ 112, in which at least one of the substantially sealed strips is discontinuous only at the level of the communication channel or channels.

~~[Claim 13]~~ [Claim 12] ____ The tank as claimed in any one of claims ~~17~~ 17 to ~~112~~ 112, in which the sealed or substantially sealed strips (15) comprise a plurality of substantially sealed strips which are traversed by a communication channel, the communication channel of a substantially sealed strip being offset from the communication channel of an adjacent substantially sealed strip in the transverse direction so as to form a network of communication channels in a quincunx arrangement.

~~[Claim 14]~~[Claim 13] The tank as claimed in any one of claims 1 to ~~12~~13, in which the thermally insulating barrier comprises a plurality of rows of insulating blocks extending in the

transverse direction, the insulating blocks having a longitudinal dimension in the direction of greatest slope, two adjacent sealed or substantially sealed strips being spaced from one another in the direction of greatest slope by a dimension equal or substantially equal to the longitudinal dimension of the insulating blocks.

~~[Claim 15]~~[Claim 14] The tank as claimed in any one of claims 1 to ~~13~~4, in which the sealed membrane (4) consists of a corrugated sealed membrane (4) including a plurality of corrugated metal plates (9) welded to one another.

~~[Claim 16]~~[Claim 15] The tank as claimed in any one of claims 1 to ~~14~~5, in which the tank comprises a single sealed membrane (4) and a single thermally insulating barrier (3).

~~[Claim 17]~~[Claim 16] The tank as claimed in any one of claims 1 to ~~14~~5, in which the sealed membrane (4) is a secondary sealed membrane and the thermally insulating barrier (3) is a secondary thermally insulating barrier, the tank including a primary thermally insulating barrier carried by the secondary sealed membrane and a primary sealed membrane carried by the primary thermally insulating barrier.

~~[Claim 18]~~[Claim 17] A ship (70) for the transport of a cold liquid product, the ship including a double hull (72) and a tank (71) as claimed in any one of claims 1 to ~~16~~7 disposed in the double hull.

~~[Claim 19]~~[Claim 18] A transfer system for a cold liquid product, the system including a ship (70) as claimed in Claim ~~17~~8, insulated pipes (73, 79, 76, 81) arranged in such a manner as to connect the tank (71) installed in the hull of the ship to a floating or terrestrial storage unit (77) and a pump for driving a flow of cold liquid product through the insulated pipes from or to the floating or terrestrial storage installation to or from the tank of the ship.

~~[Claim 20]~~[Claim 19] A method of loading or offloading a ship (70) as claimed in Claim ~~17~~8, in which a cold liquid product is routed through insulated pipes (73, 79, 76, 81) from or to a floating or terrestrial storage installation (77) to or from the tank (71) of the ship.