CLAIMS

1. A process for the forced diffusion treatment of a thermally insulating part (40) made of expanded synthetic foam positioned in a leaktight and thermally insulating vessel wall and forming an insulating barrier of the vessel wall, said process comprising:
during a discharge stage, heating all or part of the vessel wall so as to heat the insulating part to a discharge temperature greater than ambient temperature and simultaneously exposing the insulating part to a gas atmosphere exhibiting low partial pressures for molecular nitrogen, molecular oxygen, carbon dioxide and the gases having a coefficient of diffusion into the expanded synthetic foam which is greater than or equal to that of molecular nitrogen, said low partial pressures being, for each of these substances, lower than the partial pressure of said substance in air at standard pressure,
terminating the discharge stage when the accumulated partial pressures of molecular nitrogen, molecular oxygen, carbon dioxide and the gases having a coefficient of diffusion into the expanded synthetic foam which is greater than or equal to that of molecular nitrogen in the insulating part is less than a predetermined threshold or when a physical property of the insulating part related to said accumulated partial pressures reaches a predetermined threshold or after a predetermined time.

2. The process as claimed in claim 1, in which the expanded synthetic foam comprises at least 80% of closed cells.

3. The process as claimed in claim 1 or 2, in which the expanded synthetic foam is a polyurethane foam.

4. The process as claimed in claim 3, in which the polyurethane foam is a thermosetting foam.

5. The process as claimed in one of claims 1 to 4, in which the discharge temperature is less than 100°C, preferably less than 80°C.

6. The process as claimed in one of claims 1 to 5, in which the discharge temperature is greater than 50°C.

7. The process as claimed in one of claims 1 to 6, in which the blowing gas used for the manufacture of the expanded synthetic foam is essentially composed of carbon dioxide.

8. The process as claimed in one of claims 1 to 7, in which the gas atmosphere of the discharge stage exhibits a total pressure which is less than standard pressure, preferably less than 10 mbar.

9. The process as claimed in one of claims 1 to 7, in which the gas atmosphere of the discharge stage is a gas phase of gases exhibiting a molar mass of greater than or equal to 70 g/mol in forced convection.

10. The process as claimed in one of claims 1 to 9, in which the predetermined threshold is less than or equal to 30 mbar for the accumulated partial pressures of molecular nitrogen, molecular oxygen, carbon dioxide and the gases having a coefficient of diffusion into the expanded synthetic foam which is greater than or equal to that of molecular nitrogen.

11. The process as claimed in one of claims 1 to 10, in which the insulating part comprises projections or holes, small in dimension, which increase the exchange surface area of the insulating part with the gas atmosphere.

12. The process as claimed in one of claims 1 to 11, additionally comprising:
a diffusion-inhibiting action applied to the insulating part during an operational stage subsequent to the discharge stage, said inhibiting action being effective in slowing down gas diffusion toward the interior of the expanded material part.

13. The process as claimed in claim 12, in which the inhibiting action consists in exposing the insulating part to a gas atmosphere, the total pressure of which is kept below standard pressure, preferably below 10 mbar.

14. The process as claimed in claim 12 or 13, in which the inhibiting action consists in exposing the insulating part to a gas atmosphere essentially composed of a chemical entity exhibiting a molecular weight of greater than or equal to 70 g/mol.

15. The process as claimed in one of claims 12 to 14, in which the inhibiting action consists in maintaining the insulating part at a temperature of less than 0°C, preferably of less than -20°C.

16. The process as claimed in any one of claims 1 to 15, in which the insulating part comprises a gastight coating (45) positioned on an external surface of the insulating part.

17. The process as claimed in claim 16, in which the gastight coating comprises a layer of polymer resin and/or a metal sheet positioned on the external surface of the insulating part.

18. The process as claimed in claim 16 or 17, in which the insulating part is a flat parallelepipedal foam block (40), the surface of which exhibits two main faces (43, 44) parallel to directions of length and of width of the block and mutually separated in a direction of thickness of the block, and peripheral faces (41, 42) which are smaller than the main faces and which extend along the direction of thickness of the block between the two main faces, in which the leaktight coating exhibits the form of a strip (45) positioned longitudinally on the peripheral faces (41, 42) of the block all around the block and exhibiting a width which is less than the thickness of the block.

19. A leaktight and thermally insulating vessel (71) intended to contain a liquefied fuel gas at low temperature,
in which a wall of the vessel comprises a multilayer structure fitted to a carrier wall (12), the multilayer structure comprising a primary leaktightness membrane (15) in contact with the liquefied fuel gas present in the vessel, a secondary leaktightness membrane (16) positioned between the primary leaktightness membrane and the carrier wall, a primary thermally insulating barrier (17) positioned between the primary leaktightness membrane and the secondary leaktightness membrane, and a secondary thermally insulating barrier (18) positioned between the secondary leaktightness membrane and the carrier wall, and in which one or each thermally insulating barrier comprises thermally insulating parts made of expanded synthetic foam, characterized in that the vessel is equipped with a forced diffusion treatment device comprising:
a heating device (21, 22, 23) capable of heating the primary leaktightness membrane and/or the carrier wall and/or the thermally insulating barriers in order to raise the temperature of the thermally insulated parts,
a pumping device (25, 26, 27) connected to the or each thermally insulating barrier comprising the thermally insulating parts made of expanded synthetic foam and

capable of reducing the total pressure of a gas phase in the or each thermally insulating barrier below standard pressure, preferably below 10 mbar,

and a control unit (30) capable of:

controlling the heating device and the pumping device in order to simultaneously heat the thermally insulating parts to a discharge temperature greater than ambient temperature and exposing the thermally insulating parts to the total pressure lower than standard pressure during a discharge stage, and

terminating the discharge stage when the accumulated partial pressures of molecular nitrogen, molecular oxygen, carbon dioxide and the gases having a coefficient of diffusion into the expanded synthetic foam which is greater than or equal to that of molecular nitrogen in the insulating parts is less than a predetermined threshold.