Claims

1. A vacuum insulation panel comprising:

(a) a porous insulating core having an upper surface and a lower surface and sides;

(b) an envelope about the core arranged to envelop the core, and to maintain an applied vacuum within the envelope; and

(c) a non-foam polyurethane coating layer applied to the envelope, wherein the coating layer is formed over the entire external surface area of the envelope, and wherein said polyurethane coating layer is from 0.1 mm to 5 mm thick, and wherein the envelope (b) and the polyurethane coating layer (c) form a barrier layer about the insulating core (a), said barrier layer having a moisture vapour transmission rate of from 1.5×10^{-3} g/m^2.day to 3.0×10^{-3} g/m^2.day, when measured in accordance with ASTM F1249-90.

2. The vacuum insulation panel according to claim 1, wherein the envelope comprises a metallised film.

3. The vacuum insulation panel according to any preceding claim, wherein the polyurethane coating layer is from 0.1 mm to 3 mm thick, such as from 0.1 mm to 1.5 mm thick.

4. The vacuum insulation panel according to any preceding claim, wherein the polyurethane coating layer has a vapour resistivity of about 7000 MN·s/gm or more.

5. The vacuum insulation panel according to any one of claims 1 to 3, wherein the polyurethane coating layer has a vapour resistivity of from 5000 MN·s/gm to 100000 MN·s/gm.

6. The vacuum insulation panel according to any preceding claim, wherein the polyurethane coating layer is formed from a polyurethane resin composition comprising a first isocyanate containing part and a second polyol containing part.

7. The vacuum insulation panel according to any preceding claim, wherein the barrier layer about the insulating core has a moisture vapour transmission rate of about 2.5×10^{-3} g/m^2.day or less, when measured in accordance with ASTM F1249-90.

8. The vacuum insulation panel according to any preceding claim, wherein the envelope and the polyurethane coating layer form a barrier layer about the insulating core, said barrier layer having an oxygen transmission rate of from 2×10^{-3} cc/m^2.day to 5×10^{-3} cc/m^2.day, when measured in accordance with ASTM D3985.

9. The vacuum insulation panel according to any preceding claim wherein the envelope and the polyurethane coating layer together form a barrier layer about the

insulating core, said barrier layer having a moisture vapour transmission rate of 2.5 x 10^{-3} g/m^2.day or less, and an oxygen transmission rate of 4 x 10^{-3} cc/m^2.day or less.

10. The vacuum insulation panel according to any preceding claim wherein the porous insulating core is constructed from a microporous powder material selected from silica, such as fumed silica and/or precipitated silica, perlite, diatomaceous earth and combinations thereof.

11. The vacuum insulation panel according to any preceding claim having a thermal conductivity of from 3.0 mW/(m·K) to 4.5 mW/(m·K), for example, of from 3.0 mW/(m·K) to 4.0 mW/(m·K).

12. The vacuum insulation panel according to any preceding claim further comprising at least one reinforcing member arranged on the upper or lower surface of the insulating core to reinforce the core, wherein the reinforcing member is formed of a porous material, and is substantially rigid; wherein together the at least one reinforcing member and the insulating core form a hybrid core and the reinforcing member(s) do not form a thermal bridge across the insulating core; and wherein the envelope is arranged to envelop the hybrid core.

13. The vacuum insulation panel according to claim 12, having an upper reinforcing member arranged on the upper surface of the insulating core and having a lower reinforcing member arranged on the lower surface of the insulating core.

14. The vacuum insulation panel according to claim 12 or 13, wherein at least one reinforcing member comprises a metal foil facer, said metal foil facer having a thickness of from 4 microns to 50 microns, and extending across substantially the entire surface of the reinforcing member, on the upper surface or lower surface thereof and wherein the metal foil facer does not form a thermal bridge between the upper surface and lower surface of the reinforcing member.

15. The vacuum insulation panel according to any one of claims 12 to 14, wherein the density of the insulating core within the vacuum insulating panel is of from 100 kg/m^3 to 160 kg/m^3, for example, from 110 kg/m^3 to 150 kg/m^3.

16. The vacuum insulation panel according to any one of claims 12 to 15, wherein the at least one reinforcing member(s) has a density that is lower than that of the insulating core.

17. The vacuum insulation panel according to any preceding claim further comprising at least one metal foil having a thickness of from 4 microns to 50 microns, between the envelope and the insulating core and extending across substantially the entire surface of the insulating core on the upper surface or lower surface thereof and

wherein the foil does not form a thermal bridge between the upper surface and lower surface of the insulating core.

18. The vacuum insulation panel according to claim 17, wherein the metal foil is attached to the inside of the envelope.

19. The vacuum insulation panel according to claim 18, wherein the envelope comprises an envelope inner layer and the metal foil has at least one outer layer attached thereto wherein the envelope inner layer and the outer layer on the metal foil are attached to each other being optionally bonded to each other.

20. The vacuum insulation panel according to any one of claims 17 to 19, comprising two metal foils having a thickness of from 4 micron to 50 micron, wherein one metal foil extends across substantially the entire surface of the core on the upper surface and a second metal foil extends across substantially the entire surface of the core on the lower surface.

21. The vacuum insulation panel according to any preceding claim further comprising a layer of adhesive on the outer surface of the panel.

22. The vacuum insulation panel according to claim 21, wherein the adhesive is a pressure sensitive adhesive.