CLAIMS:

1. A method of forming a moulded polymer article, the method comprising:

(a) providing a mould having a first mould part and a second mould part, the first and second mould parts having respective first and second cavity-forming surfaces;

(b) closing the mould thereby defining a cavity between the first and second cavity-forming surfaces;

(c) injecting into the cavity a molten plastic composition comprising a polymer and a blowing agent system which is dispersed within the polymer, the molten plastic composition being injected at an injection pressure, wherein the blowing agent system comprises a physical blowing agent wherein the physical blowing agent comprises a first gas dissolved in the polymer, and in combination with the physical blowing agent a chemical blowing agent, the chemical blowing agent comprising a chemical precursor which can decompose to form a second gas, wherein the first gas is an inorganic gas which is dissolved in the molten plastic composition at a concentration of from 0.2 to 1.5 wt%, based on the total weight of the molten plastic composition and wherein the second gas is an inorganic gas as the second gas and the chemical precursor is dispersed or dissolved in the molten plastic composition at a concentration of from 0.5 to 4.0 wt%, based on the total weight of the molten plastic composition,

wherein during or after the injecting step (c), the injected plastic composition in contact with the first and second cavity-forming surfaces is cooled to form first and second solid skins respectively adjacent to and in contact with the first and second cavity-forming surfaces, whereby in at least one region of the cavity is respectively located at least one portion of the plastic composition in which portion at least some of the plastic composition between the first and second solid skins remains molten, wherein the at least one portion has a thickness of from greater than 0.45 mm to up to 1 mm;

(d) opening the mould before the molten plastic composition between the first and second solid skins has solidified in the at least one portion, so as to expose the molten plastic composition of the respective portion to an external pressure lower than the injection pressure thereby allowing the molten plastic composition between the first and second solid skins of the respective portion to expand by foaming to form an expanded cellular foam as a result of the molten plastic composition beneath the first solid skin expanding outwardly away from the second solid skin, wherein the opening step comprises removing the first mould part so that the first solid skin is no longer in contact with the first cavity-forming surface,

wherein the molten plastic composition between the first and second solid skins of the respective portion expands by foaming to form the expanded cellular foam in a first foam forming phase and in a subsequent second foam forming phase,

wherein in the first foam forming phase the physical blowing agent comes out of solution in the polymer to form bubbles of the first gas which form first and second layers of the expanded cellular foam, the first layer being adjacent to the first solid skin and the second layer being adjacent to the second solid skin, thereby to increase a separation distance between the first and second solid skins, and

in the subsequent second foam forming phase the physical blowing agent continues to form the first gas, and the chemical precursor of the chemical blowing agent decomposes to form the second gas, and the first gas and the second gas form further gas bubbles which form an intermediate layer of the expanded cellular foam, the intermediate layer being between, and adjacent to, the first and second layers, thereby further to increase the separation distance between the first and second solid skins, wherein the intermediate layer comprises cells which have an average aspect ratio between a maximum cell dimension and a minimum cell dimension which is greater than 2:1 and less than 5:1 and the maximum cell dimension of the cells is oriented in a direction extending between the first and second solid skins; and

(e) cooling the expanded cellular foam to cause the molten plastic composition between the first and second solid skins of the respective portion to solidify and to form in the moulded polymer article a monolithic wall part comprising a core layer of the expanded cellular foam disposed between, and integral with, the first and second solid skins, wherein the core layer is multilaminar and comprises the first layer, the intermediate layer and the second layer of the expanded cellular foam, wherein the first and second layers comprise a first cellular microstructure and the intermediate layer comprises a second cellular microstructure, wherein the first cellular microstructure comprises or consists of closed cells having an average maximum cell dimension of from 200 to 500 μm, and wherein the second cellular microstructure comprises or consists of open cells interconnected by ruptured cellular walls wherein in the second cellular microstructure the open cells have an average maximum cell dimension of from greater than 500 to up to 1500 μm.

2. The method of claim 1, wherein in the first cellular microstructure the closed cells have an average aspect ratio between a maximum cell dimension and a minimum cell dimension of from 1:1 to less than 2:1.

3. The method of claim 1 or claim 2, wherein in the first cellular microstructure the closed cells have an average aspect ratio between a maximum cell dimension and a minimum cell dimension which is greater than 1:1, and the maximum cell dimension of the closed cells is oriented in a direction extending between the first and second solid skins.

4. The method of claim 3, wherein in the first cellular microstructure the maximum cell dimension of the closed cells is oriented in a direction which is orthogonal to, or inclined at an acute angle to, the first and second solid skins.

5. The method of any one of claims 1 to 4, wherein in the second cellular microstructure the cells have an average aspect ratio between a maximum cell dimension and a minimum cell dimension which is greater than 3:1 and less than 5:1.

6. The method of claim 5, wherein in the second cellular microstructure the maximum cell dimension of the cells is oriented in a direction extending between the first and second solid skins.

7. The method of claim 6, wherein in the second cellular microstructure the maximum cell dimension of the cells is oriented in a direction which is orthogonal to, or inclined at an acute angle to, the first and second solid skins.

8. The method of any one of claims 1 to 7, wherein prior to the opening step (d), the at least one portion has a thickness of from 0.7 mm to up to 1 mm.

9. The method of any one of claims 1 to 8, wherein after the cooling step (e), the at least one wall part has a thickness of from 1 to 3 mm.

10. The method of claim 9, wherein after the cooling step (e), the at least one wall part has a thickness of from 1 to 2 mm.

11. The method of any one of claims 1 to 10, wherein from the opening step (d) to the cooling step (e), the at least one first portion has increased in thickness by from 1 to 2.5 mm to form the at least one wall part.

12. The method of claim 11, wherein from the opening step (d) to the cooling step (e), the at least one first portion has increased in thickness by from 1 to 1.5 mm to form the at least one wall part.

13. The method of any one of claims 1 to 12, wherein from the opening step (d) to the cooling step (e), the at least one first portion has increased in thickness by an expansion factor within the range of from 2 to 4 to form the at least one wall part.

14. The method of claim 1, wherein the first gas is selected from nitrogen and carbon dioxide or a mixture thereof.

15. The method of claim 1, wherein the chemical precursor comprises a carbonate or bicarbonate salt and the second gas is carbon dioxide.

16. The method of claim any one of claims 1 to 15, wherein the first gas is nitrogen and the second gas is carbon dioxide.

17. A moulded polymer article comprising a monolithic wall part composed of a polymer, the monolithic wall part comprising a core layer of expanded cellular foam, composed of the polymer, disposed between, and integral with, first and second solid skins, composed of the polymer, wherein the core layer is multilaminar and comprises a first layer of the expanded cellular foam adjacent to the first solid skin, a second layer of the expanded cellular foam adjacent to the second solid skin, and an intermediate layer of the expanded cellular foam which is between, and adjacent to, the first and second layers, wherein the first and second layers comprise a first cellular microstructure comprising closed cells, wherein in the first cellular microstructure the closed cells have an average maximum cell dimension of from 200 to 500 μm, and the intermediate layer comprises a second cellular microstructure comprising cells which have an average aspect ratio between a maximum cell dimension and a minimum cell dimension which is greater than 2:1 and less than 5:1 and wherein in the second cellular microstructure the maximum cell dimension of the cells is oriented in a direction extending between the first and second solid skins, wherein in the second cellular microstructure the cells have an average maximum cell dimension of from greater than 500 to up to 1500 μm and in the second cellular microstructure the cells comprise or consist of open cells interconnected by ruptured cell walls.

18. The moulded polymer article of claim 17, wherein in the first cellular microstructure the closed cells have an average aspect ratio between a maximum cell dimension and a minimum cell dimension of from 1:1 to less than 2:1.

19. The moulded polymer article of claim 17 or claim 18, wherein in the first cellular microstructure the closed cells have an average aspect ratio between a maximum cell dimension and a minimum cell dimension which is greater than 1:1, and optionally less than 2:1, and the maximum cell dimension of the closed cells is oriented in a direction extending between the first and second solid skins.

20. The moulded polymer article of any one of claims 17 to 19, wherein in the second cellular microstructure the cells have an average aspect ratio between a maximum cell dimension and a minimum cell dimension which is greater than 3:1 and less than 5:1.

21. The moulded polymer article of any one claims 17 to 20, wherein in the second cellular microstructure the maximum cell dimension of the cells is oriented in a direction which is orthogonal to, or inclined at an acute angle to, the first and second solid skins.

22. The moulded polymer article of any one of claims 17 to 21, wherein the wall part has a thickness of from 1 to 3 mm.

23. The moulded polymer article of claim 22, wherein the wall part has a thickness of from 1 to 2 mm.