An apparatus for providing a preform assembly can be characterized by comprising at least one first mould cavity for forming a first preform and at least one second mould cavity for forming a second preform. The apparatus can further comprise at least one transfer device for moving a first preform into a second preform and/or a second preform over a first preform.

In view of the above, according to a first aspect of the invention, there is provided a plastic container comprising an inner container and an outer container with facing surfaces, wherein at least part of at least one of the facing surfaces has a surface roughness higher than about 0.1 μm Ra and/or wherein the difference in roughness of said facing surfaces is at least over a part more than about 0.1 μm Ra.

According to a second aspect of the invention, there is provided a preform set for integrally blow moulding a container, especially according to any one of the containers disclosed herein, comprising at least an outer preform and an inner preform, fitting at least partly inside the outer preform, both having a neck forming portion, a shoulder forming portion and a body forming portion, wherein at least a first of the inner and outer preform has a surface region in contact with the other of the inner and outer preform, wherein:

- at least part of said region has a surface roughness of at least 0.1 μm Ra and/or a surface roughness which is at least 0.1 μm Ra higher than the surface roughness of the surface area of the other of the inner and outer preform with which it is in contact and/or
- at least part of said region has a surface roughness such that in a container integrally blow moulded from said assembly of preforms the surface area of the container formed from said surface region has a surface roughness of at least 0.1 μm Ra and/or a surface roughness of at least 0.1 μm Ra higher than the surface roughness of an adjacent surface area of the adjacent container.

According to a third aspect of the invention, there is provided a method for forming a preform assembly for blow moulding a container according to the containers disclosed herein, wherein a first preform is injection moulded and a second preform is injection moulded, wherein the first preform is inserted into the second preform and/or the second preform is provided over the first preform, wherein at least one of the preforms, preferably the first preform is injection moulded from a plastic mass containing particles different from the plastic, especially metal and/or metalized particles, such as metal and/or metalized flakes.

Some further advantageous embodiments of a preform assembly, container, method and apparatus are described in the further claims. Some embodiments will be described hereafter in relation to the drawings, by way of example only and which should by no means be understood as limiting the scope of the invention as claimed in any way. Herein shows:

Fig. 1 schematically in cross section a preform assembly in a first embodiment;

Fig. 1A schematically a detail of the neck area of a preform assembly;

Fig. 2 schematically in cross section a preform assembly in a second embodiment;

Fig. 3 schematically in cross section a preform assembly in a third embodiment;

Fig. 4 schematically and partially in cross section a container, in a first embodiment;

Fig. 5 schematically and partially in cross section a container, in a second embodiment;

Fig. 6 schematically preform assembly and container;

Fig. 7 schematically a neck portion of a container with a closure, in a first embodiment; and

Fig. 8 schematically a neck portion of a container with a closure, in a second embodiment;

Fig. 9 in exploded view an alternative embodiment of a preform assembly with a closure ring;

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## Claims

1. Plastic container comprising an inner container and an outer container with facing surfaces, wherein at least part of at least one of the facing surfaces has a surface roughness higher than about 0.1 μm Ra and/or wherein the difference in roughness of said facing surfaces is at least over a part more than about 0.1 μm Ra.

2. Plastic container according to claim 1, wherein said at least one surface is the outer surface of the inner container.

3. Plastic container according to claim 1 or 2, wherein the inner and outer container have a neck portion, wherein an outer surface part of the neck region of the inner container and/or an inner surface part of the neck portion of the outer container has a surface roughness of at least 0.1 μm Ra.

4. Plastic container according to any one of the previous claims, wherein said surface roughness is at least 0.25 μm Ra, preferably between 0.25 μm Ra and 2 μm Ra, more preferably between 0.25 μm Ra and 1 μm Ra.

5. Plastic container according to claim 4, wherein said roughness is at least 0.30 μm Ra.

6. Plastic container according to any one of the previous claims, wherein the inner container and/or outer container having said surface roughness on at least part of a surface comprises particles enclosed in the wall, between the plastic forming chains of the plastic wall of the container.

7. Plastic container according to claim 6, wherein the particles are made of or at least contain material different from the plastic of the wall of said container, especially metal.

8. Plastic container according to claim 6 or 7, wherein the particles are or contain flakes, especially metal flakes, more particularly aluminum flakes.

9. Plastic container according to any one of claims 6 – 8, wherein the particles form between 0.5 and 5%, in particular between 0.5% and 2.5%, more particular between 0.5% and 2% percent, by weight of the container.

10. Plastic container according to any one of the previous claims, wherein the container is integrally blow moulded from a preform-in-preform, wherein at least one of the preforms has been roughened at least in part, after injection moulding thereof, and/or wherein at least one of the preforms has been injection moulded in a mould having an at least partly roughened mold surface and/or wherein at least one of the preforms is provided with a foamed surface layer of plastic, especially PET.

11. Plastic container according to any one of the previous claims, wherein at least one of an preferably both of the inner container and the outer container are made of PET or a PET blend, or similar crystalline or semi-crystalline plastic, wherein the inner container is connected to the outer container at a neck region closing off a space between the inner and the outer container, wherein at least one opening is provided into said space for introducing a pressurizing medium into said space, wherein the container has a body in which the outer container abuts the inner container and wherein the inner container can be compressed by said pressurizing medium at a pressure below 2 Bar absolute.

12. Plastic container blow moulded from a preform assembly comprising a first preform in a second preform, according to any one of claims 1 - 11, wherein a first layer of the container formed from the first preform and a second layer, outside the first layer, formed from the second preform, wherein the plastics material of the first preform has been stretched further for forming the first layer than the plastics material of the second preform for forming the second layer.

13. Plastic container according to any one of claims 1 - 12, wherein the inner and outer container have a neck portion, wherein an outer surface part of the neck portion of the inner container and/or an inner surface part of the neck

portion of the outer container has a surface roughness of at least 0.1 µm Ra

and wherein the further surface parts of the outer surface of the inner container and the inner surface of the outer container of at least body forming portions thereof either have the same surface roughness or a lower surface roughness.

14. Plastic container according to any one of the previous claims, wherein the outer container is transparent or translucent, which can be coloured, and the inner container is opaque or non-transparent, having preferably a light reflecting outer appearance, such as silver colored.

15. Preform set for integrally blow moulding a container, especially according to any one of the previous claims, comprising at least an outer preform and an inner preform, fitting at least partly inside the outer preform, both having a neck forming portion, a shoulder forming portion and a body forming portion, wherein at least a first of the inner and outer preform has a surface region in contact with the other of the inner and outer preform, wherein:

- at least part of said region has a surface roughness of at least 0.1 μm Ra and/or a surface roughness which is at least 0.1 μm Ra higher than the surface roughness of the surface area of the other of the inner and outer preform with which it is in contact and/or
- at least part of said region has a surface roughness such that in a container integrally blow moulded from said assembly of preforms the surface area of the container formed from said surface region has a surface roughness of at least 0.1 μm Ra and/or a surface roughness of at least 0.1 μm Ra higher than the surface roughness of an adjacent surface area of the adjacent container.

16. Preform set according to claim 15, wherein the said first preform is the inner preform.

17. Preform set according to claim 15 or 16, wherein said first preform is injection moulded from plastic, having a wall, wherein in the wall

particles are dispersed, especially flakes, which are enclosed between monomer and/or polymer chains of the plastic.

18. Preform set according to claim 17, wherein the particles, especially flakes comprise a material different from the plastic, especially metal or metalized particles.

19. Preform set according to claim 17 or 18, wherein the particles are light reflecting and/or are coloured particles, especially particles having at least partly a silver colour, for example made of aluminum.

20. Preform set according to any one of claims 17 - 19, wherein the particles are or comprise flakes.

21. Preform set according to any one of claims 17 - 20, wherein the particles are contained in a layer of a material having a lower melting point that of the particles and/or the plastic, especially a wax or wax type material, preferably a wax type material which is not precipitated from the preform or container during and/or after blow moulding a container from said set of preforms.

22. Preform set for blow moulding a container, comprising at least a first and a second preform, according to any one of claims 15 - 21, wherein the first preform is positioned inside the second preform before blow moulding the preforms into the container, wherein each preform has a body forming portion having a wall thickness of less than about 8 millimetres, preferably less than about 6 mm.

23. Preform set according to any one of claims 15 - 22, wherein at least one of the preforms has been roughened at least in part, after injection moulding thereof, and/or wherein at least one of the preforms has been injection moulded in a mould having an at least partly roughened mold surface.

24. Preform set according to claim 23, wherein the surface roughness of the part of the preform roughened after injection moulding or formed in

said roughened mould is about 0.1 μm Ra or more, especially above 0.3 μm Ra, more particularly above 0.5 μm Ra, such as for example between 0.6 μm Ra and 0.7 μm Ra.

25. Preform set according to any one of claims 15 - 24, wherein at least the second preform, preferably the first and the second preform, is made of standard PET, preferably free of anti crystallisation additives.

26. Preform set according to any one of claims 17 - 21, wherein the preform assembly forms a multi layered preform, wherein at least one of the preforms or layers comprises said particles, especially flakes.

27. Method for forming a preform assembly for blow moulding a container according to claim 1, wherein a first preform is injection moulded and a second preform is injection moulded, wherein the first preform is inserted into the second preform and/or the second preform is provided over the first preform, wherein at least one of the preforms, preferably the first preform is injection moulded from a plastic mass containing particles different from the plastic, especially metal and/or metalized particles, such as metal and/or metalized flakes.

28. Method according to claim 27, wherein the particles are added to the plastic mass prior to injection moulding, wherein the particles are at least partly enclosed in and/or provided with a covering layer made of a different material, especially a material having a melting temperature lower that that of the plastic.