perfectly resistant to the high-risk contents comprising an explosive fluid, whereas in the applications considered here, only edible materials, cosmetics and other non-explosive fluids or discontinuous filling products notably are envisaged, and at any rate fluids which do not entail any risk of explosion. The basic conditions imposed on the container wall are thus totally different, which in the present case, is a determining factor given that, according to the present development, the aim is simply to be able to reduce the thickness of the body of the container as far as possible.

To summarise, the need therefore exists for a lighter plastic container for pressure packaging, which is intended for packaging a continuous filling product, i.e. fluids such as gases or liquids with a continuous character, possibly semi-liquid, or also discontinuous fluids such as foam, pastes, creams, gels and even powders and the like, to be expelled after the exertion of a pressing action on the container.

There are such plastic polymer containers which comprise at least one end opening on the top side of a mantel forming the body of the container that is closable at the top with a closure of the cap type.

Purpose of the invention

~~The object of the invention~~Various embodiments consists in pressurising the plastic container acting as packaging with filling product, notably from atmosphere to about 50 bar and more, up to pressures rising to approx. 100 bar or possibly even higher to 300 bar.

Summary ~~of the invention~~

~~To achieve this aim,~~ According to a first aspect, there is provided a container for packaging under pressure of a filling product continuum, including (semi-)liquid fluids, resp. discontinuous filling product such as foam, pastes, cream, or powders, comprising a neck section with a pouring opening on its top side, an adjacent sheathing section forming the body of the container, and a bottom section of the container, which is essentially composed of a plastic polymer which is closable on said top section with a closure, characterised in that the bottom section disposed opposite said top section is closed by a separately added bottom which is attached to said body by means of a joint, and in that said body is provided with a set of reinforcements.

~~a~~ A container made from plastic polymer is proposed ~~according to this invention, as defined in the main claim~~. It is remarkable in that it comprises at least one end opening, in particular two, on the top and base sides of a sleeve forming the body of the container, the base side of which is closed by a specially added base, that is attached to said container body by means of a joint, and which is closed above with a closure. In addition, a set of reinforcement elements Is provided at least on the body which makes the container resistant to high internal pressures.

According to a second aspect, there is provided a container for packaging under pressure of continuum filling products, including fluids, resp. discontinuous filling products such as foam, pastes, cream, or powders, comprising a neck part with a pouring opening at its top, a sleeve part, which is adjacent thereto and which forms the body of said container, and a base part,

which is essentially composed of a plastic polymer, characterized in that an inner container under internal pressure p_2 is provided therein, which is completely enclosed in said container under a pressure p_1 and which is attached to the base thereof, thereby forming a double container system wherein the inner container is supported additionally by said container.

According to a further preferred embodiment of the invention, a container made from plastic polymer is proposed ~~thus as defined in the following claim~~, which is remarkable in that an inner container is provided in this container. Thus by means of such a double container system according to a more specifically defined embodiment of the invention, a particularly advantageous application consists in making a pressure packaging in an inner bottle, withstanding pressures ranging from 20 to 50 bar and more, possibly up to 100 bar, or even to 300 bar, so that, if a problem occurs within the container, the outer container will absorb everything, thereby acting as a kind of fuse safety container.

According to a quite remarkable embodiment of the invention, Pascal's law is applied, stating that a pressure exerted on a liquid present in a completely filled and enclosed vessel will be transmitted undiminished in all directions. This taw is applied here to a pressure container comprising an inner container, wherein the latter container completely encloses the inner container as an actual global outer container, if the inner container is placed under a high pressure and the outer container under a lower pressure, wherein both pressures are higher than atmospheric pressure, the residual pressure on the inner container is equal to the difference between the high pressure of the inner container

According to a third aspect, there is provided a method for manufacturing a container of the pressure container packaging type according to any one of the preceding claims, characterised in that a container body profile with a longitudinal axis (ℓ) is first formed with subsequent cutting hereof to form a tubular element to the required longitudinal dimension (L), characterized in that pressure means are arranged herein to pressurise the container packaging with the filled product, i.e. to pressure p_1 particularly ranging from atmosphere to approx. 100 bar, and more, by gassing, particularly wherein the latter is formed by means of the container body formed by the extrusion process, more particularly wherein the container head or body top section is closed with a cover, even more particularly wherein this cover is a dosing valve, a screw cap or another closure.

This ~~invention~~ disclosure also relates to a method for manufacturing a pressure container packaging as specified above, wherein the container used herein is made by a one-step process with subsequent cutting of the container in order thus to obtain a tube, wherein pressure means are fitted therein to pressurise the container packaging with the filling product, particularly from atmosphere to approx. 20 bar and more, possibly up to 100 bar, through gassing. The container can also be formed by a two-step process. The container can be formed directly by injection moulding, without cutting, ft can still be cut afterwards.

According to a particular embodiment of the method of the invention, a flexible inner container or bag is inserted into the container to prevent the filling product from coming into contact with the outer wall or with the pressure gas (gases, air), particularly wherein a flexible inner container is incorporated into the container by blowing.

The pressurisation therein can be performed through the closable lower valve via an opening which is self-closable by means of the seal, wherein this seal consists of a tube element which is made from a flexible plastic, particularly wherein the pressurisation therein can take place via the closable upper valve, notably via a so-called "umbrella plug" which is self-closable, or via a so-called "Nichelson plug".

According to a more particular embodiment of the method of the invention, the container is made from plastics by stretching and blowing an injection moulding preform which has a high crystallinity in order to have a higher thermal dimensional stability, wherein said crystallinity substantially forms an orientation-induced crystallinity, particularly wherein the crystallinity is higher than 30%, more particularly between 35 and 40 %.

More particularly, said container is made from a PET blend or copolymer with a different polyester resistant to a greater heat, particularly according to an extreme low level thereof, more particularly wherein said polyester is formed by a polyethylene naphthaiate; a polytrimethylene naphthalate; or by the plastic material known as PETN-5 type 400105.

According to a fourth aspect, there is provided a use of a container as described herewith.

Further particularities and features of the invention are defined in further dependent claims. Further details are shown in the following for some embodiments of the invention with reference to the attached drawings. The same reference signs refer to identical or analogous elements herein.

Brief description of the drawings

Figures 1 to 15 et seq. each show an embodiment of a container according to the invention, in each case with variants in several views, full and/or partial views, wherein

Fig. 1 shows a mixed combined view in perspective in partial cross section of the bottom section of a first embodiment of the container according to the invention;

Fig. 2 shows a completed side view of the representation of the embodiment of the container according to the invention represented in Fig. 1;

Fig. 3 shows a similar combined view of the embodiment of the container represented in both preceding Fig., but of a top portion thereof;

Fig. 4 shows a combined perspective view in partial cross-section of the bottom section of a second embodiment of the container according to the invention;

21. Container according to one of the claims 10 to 20, characterized in that said inner support rings (31) are composed of plastics and/or in that said outer support rings (32) are composed of plastic and/or metal.

22. Container according to one of the claims 10 to 21 , characterized in that it includes chemical reinforcements, in particular in the container wall (22) thereof (1).

23. Container according to any one of the preceding claims, in particular the preceding one, characterized in that it is transparent, in particular on the container body wall, more particularly at least over a part thereof.

24. Container according to one of the preceding claims, characterized in that said plastic material from which it is made consists of a biaxially stretchable material, in particular PET (polyethylene terephthalate).

~~25. Container according to one of the preceding claims, characterized in that it consists of a synthetic material, in particular modified PET, that is such that is resistant to high(er) pressure and/or temperature, and more particularly if it (23) is provided with an end opening at the bottom and it is not cut off at the bottom.~~

~~26. Container according to one of the preceding claims, characterized in that it (1) is composed of plastic material by stretching and blowing of an injection-molding preform, which has a high crystallinity so as to have a higher thermal dimensional stability, wherein said crystallinity constitutes essentially an orientation-induced crystallinity, in particular in which the crystallinity is higher than 30%, more in particular comprised between 35 and 40%.~~

~~27~~25. Container according to the preceding claim, characterized in that it consists of another plastic material, notably polyolefins, in particular polypropylene or polyethylene, polystyrene, polyesters, in particular PETG or PBT, polycarbonate, polyamides, or copolymers thereof or blends thereof, more in particular with another polyester resistant to higher heat, even more in particular according to an extremely low level thereof, still more in particular wherein said polyester is formed by a polyethylene naphthalate, a polytrimethyiene naphthalate; or by the plastic material known as PETN type-5 400 105.

~~28~~26. Container according to one of the preceding claims, characterized in that said plastic consists of a so-called "Polymer bio-aggregate", In particular with the incorporation therein of a barrier, more particularly a chemical, resp. gas or even light barrier.

~~29. Container intended for containing radiation-sensitive products, such as light and/or gas-sensitive products, in particular food, cosmetics, or also detergents, and others, which is composed of at least one base layer (1) consisting of a primary plastic base material (11) with a certain amount of additives (12) which are included in said base layer, characterized in that the preform from which it (1) is manufactured possesses thermal properties which are such that the thermal shrinkage thereof does not exceed a certain set value at a predetermined set value of the operating temperature, in particular wherein said shrinkage setting value does not exceed 4% to 5%, in particular at most 3,5%, preferably up to 1%.~~

~~30. Container according to the preceding claim, characterized in that the additives consist of PET additives.~~

~~31. Container according to one of both preceding claims, characterized in that the preform (20) possesses a single-layer structure.~~

~~32. Container according to one of the claims 29 to 31, characterized in that it (1) has a multi-layer structure, in particular a three-layered structure consisting of said primary base layer in which an intermediate layer is included which acts as a barrier layer, in particular as a light and/or oxygen barrier, which is composed of a secondary plastic material so that virtually all the transmitted light and/or oxygen can be cut off.~~

~~33~~27. Container according to one of the preceding claims, in particular the preceding one, characterized in that said container is coated in and/or out, in particular with acrylates.

~~34~~28. Container according to one of the claims 1 to ~~33~~27, characterized in that it (1) is closed at said bottom side by a full cover (28) that is fixedly attached to the container by means of a fixed connection.

~~35~~29. Container according to the preceding claim, characterized in that said compound is formed by a welded joint (13), in particular by a laser, induction, respectively ultrasonic compound, or a glue joint.

~~36~~30. Container according to one of claims 1 to 5, characterized in that it (1) is provided with a bottom (21) with a semi-spherical profile in order to allow in the container (1) even more pressure, wherein a bottom holder (25) is provided.

~~37~~31. Pressurized container according to any one of the preceding claims, characterized in that a valve is included in the added base (21').

~~38~~32. Pressure container according to any one of the preceding claims, characterized in that it (1) is formed by a muiti-chamber system consisting of at ieast one chamber (51), in particular two (52), wherein the pressure container (1) is closed at the bottom, and a chamber partition (59) is provided between the various chambers in the container.

~~39~~33. Pressure container according to the preceding claim, characterized in that the chamber partition (59) is provided with at least one pressure control valve (50), resp. gassing valve as closure.

~~40~~34. Pressure container according to the preceding claim, characterized in that said closure is adjustable indirectly from outside in an open or closed position by means of a pressure control valve (50), so that the contents of the chamber (51) is able to come into contact with the chamber (52), whether or not the chambers are under pressure.

~~41~~35. Pressure container according to the preceding claim, characterized in that both bottom and top sides (21, resp. 23) are closed by means of a single closing piece, in particular a shut-off valve (58).

~~42~~36. Pressure container according to the preceding claim, characterized in that said shut-off valve (58) is made from a dosage valve (57), or a screw cap resp.

~~43~~37. Pressure container according to any one of the preceding claims, characterized in that it comprises physical reinforcements, particularly foils, reinforcement rings and/or ribs, internal and/or external slots; and/or chemical reinforcements notably by an increased crystallinity, glass transition temperature, polymer blends, including the use of PEN and increasing crystallinity; and/or chemical resistance, particularly by means of blends, coatings, including internal coating; and/or particular forms, particularly a pressurised container of the construction type 'bottle in bottle' as reinforcement, respectively a "bag in bottle ', a one/two-chamber system, or also a " spherical bottom with base-cup'.

4438. Method for manufacturing a container of the pressure container packaging type according to any one of the preceding claims, characterised in that a container body profile (90) with a longitudinal axis (f) is first formed with subsequent cutting hereof (90) to form a tubular element (91) to the required longitudinal dimension (L), characterized in that pressure means are arranged herein to pressurise the container packaging (1) with the filled product, i.e. to pressure particularly ranging from atmosphere to approx. 100 bar, and more, by gassing, particularly wherein the latter (1) is formed by means of the container body (91) formed by the extrusion process, more particularly wherein the container head (11) or body top section (22') is closed with a cover (5), even more particularly wherein this cover is a dosing valve (17), a screw cap or another closure.

4539. Method, according to the preceding claim, for manufacturing a pressure container particularly as defined in one of the claims 1 to 4337, wherein it is formed by means of an extruded tube (3) which is cut through at least once, in particular twice, wherein both open ends of the body (22') thus formed are sealed by a single piece, valve or cover (5).

4640. Method according to one of both preceding claims, characterized in that said top section is sealed with a container head (11) which is fixed by means of a connection (12) to the pressurized container (1).

4741. Method according to any one of the claims 44-38 to 5340, characterized in that said connections (12) are performed by means of gluing, crimping or welding, in particular laser welding, more particularly by laser, induction, or ultrasonic welding.

4842. Method according to claim 46, characterized in that the fixations of the rings are glued or welded together.

4943. Method according to any one of the claims 44-38 to 4842, characterized in that said outer support rings (10) are incorporated directly when blowing the container.

5044. Method according to any one of the claims 44-38 to 4943, characterized in that a flexible inner container (16) or bag is inserted into the container for preventing the filling product to come in contact both with the outer wall, and with the pressure gas consisting of air or other gases.

5145. Method according to the preceding claim, characterized in that a flexible inner container (16) is introduced by blowing into the container (1) which acts as main container.

5246. Method according to any one of claims 44-38 to 5145, for manufacturing a pressurized container packaging according to any one of the claims 1 to 4337, characterized in that the production process of the pressurized container is performed as follows:

in a first step (A), a preform is extruded as a semi-finished product by injection molding, wherein plastic granules are dried, melted in an extruder and subsequently driven in an injection mold;

in a subsequent step (B), said semi-finished product is blown in a blow mold to a bottle shape, in particular tubular (3), as a further intermediate product (3);

in a further next step (C) between the bottom of said additional intermediate product (3) is cut at a certain length, whereby a separately added injection molding base (21) is then incorporated in said additional intermediate product (3),

5347. Method according to the preceding claim, characterized in that the pressurization of filling product in said container (1) is done via the lockable bottom valve via an opening (43) that is self-

closable by the seal (44), wherein the seal (44) consists of a tubular element that is made out of a flexible plastic,

5448. Method according to the preceding claim, characterized in that the pressurizing therein (1) is done via the sealable top valve (47), in particular through a self-locking element, in particular a so-called "umbrella plug" (46), or via a two-step element, in particular a so-called two-step "Nicholson plug" (47).

~~55. Method for manufacturing a container intended for encapsulating products therein, including dairy products, by injection molding of a preform followed by blowing it to a container according to any of the corresponding claims, characterized in that the preform is made by adding a certain percentage of additives (12) to an injectable primary plastics material (11), thereby forming a so-called blend (13) for increasing the so-called glass transition temperature value T_g, which (13) is injected to generate said preform, which is then blown out to a container with said T_g value, for protecting the interior (9) thereof against external radiation and gas, in particular electromagnetic radiation, more particularly light, in such a way that the refractive index of said primary material is affected so that said radiation is virtually broken.~~

~~56. Method according to the preceding claim, characterized in that additives are further added to said co-polymer to increase the crystallinity of the container.~~

~~57. Method for producing a container, as defined in any one of the claims 25 to 28, made from plastics by stretching and blowing thereof, which has a high crystallinity for having a higher thermal dimensional stability, characterized in that it is formed by an injection molded preform, wherein the crystallinity is essentially an orientation-induced crystallinity.~~

~~58. Method according to the preceding claim, characterized in that said glass transition temperature value is increased to a target value of at least 95°C, preferably up to 100°C.~~

~~59. Method according to one of both preceding claims, characterized in that polymer additives are chosen such that said T_g value of said ensuing blend (13) is increased to a value which is higher than that of said primary plastic material (11).~~

~~60. Method according to any one of the claims 33 or 34, characterized in that the preform (10) is nucleated by the addition of a nucleating agent or nucleator in said primary base material (11), thereby forming crystal lattices therein.~~

~~61. Method according to the preceding claim, characterized in that the preform is heated to a certain heating temperature to generate a crystallization effect of said polymer, wherein an increased crystallization of said base material is brought about by means of the action of an appropriate agent therefor.~~

~~62. Method as claimed in any one of the claims 44 to 61, characterized by the injection molding of a multi-layer preform with co-injection followed by blowing it to a container.~~

~~63. Method for producing a container, as defined in one of the claims 1 to 43, which is made of a PET co-polymer, and a further higher heat polyester, characterized in that one gets started from an injection molded preform, which is made of this material, wherein the temperature at which said preform is heated for the blowing operation, is higher than the glass transition temperature of said~~

~~polyester higher heat polyester fraction, and in that said blow molding operation is carried out as soon as said temperature is reached.~~

~~64. Method according to the preceding claim, characterized in that said preform is heated to a temperature which is higher than the glass transition temperature of said polyester fraction, and in that it is then immediately blown in the blowing and injection molding operation when stretching.~~

~~65. Method according to one of both preceding claims, characterized in that said temperature is set between about 125°C and 130°C, in particular wherein said preform is heated to a temperature ranging between 125 and 130°C, and which is then immediately blown in the blowing and injection molding operation when stretching.~~

~~66~~49. Use of a container according to any one of the claims 1 to ~~43~~ 37 for oval containers or bottles such as used for sauces and ketchup with a so-called hot fill process.