ONE-PIECE, CONTINUOUSLY BLOW MOLDED CONTAINER WITH RIGID FITMENT

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(57) ABSTRACT

A one-piece, blow molded fluoropolymer container, having a thin-walled, flexible bag portion and one or more rigid, thick-walled fitment, wherein the bag and the one or more rigid fitment are formed during the same blow molding process, from a continuous source of fluoropolymer material, to form a complete, one-piece, fully integrated container.
ONE-PIECE, CONTINUOUSLY BLOW MOLDED CONTAINER WITH RIGID FITMENT

CROSS-REFERENCE TO RELATED APPLICATION


FIELD OF THE INVENTION

[0002] A one-piece, continuously blow molded, fluoropolymer container for storage, transport, and dispensing of various liquid, gel, powder, and pelletized materials. In particular, the present blow molded container invention is formed using a continuous, single step blow molding process to create a complete, fully-integrated, one-piece container that includes a collapsible, thin-walled, bag portion constructed of a thin layer fluoropolymer film and one or more rigid fitment which are formed of a greater thickness fluoropolymer resin, as compared to the thin fluoropolymer film.

BACKGROUND OF THE INVENTION

[0003] The assembly of multiple component (multi-piece) containers constructed of fluoropolymer material for use in storing, transporting, and dispensing various materials, where the container is constructed from a multi-step manufacturing process, is known in the container industry. One benefit of using containers made from fluoropolymer material includes little or no adverse effect to the container when used to store corrosive chemicals. Additionally, fluoropolymer containers have advantageous chemical and mechanical properties including a desired tensile strength, a desired compressive strength, an extended flex life, advantageous abrasion resistance, and strong impact strength. Containers constructed of fluoropolymers can be used in temperature ranges of a high of 400+ degrees Fahrenheit to a low of −100 degrees Fahrenheit. Fluoropolymer containers are also inherently flame resistant. Further, fluoropolymer containers have extremely low permeability to liquids, gasses, and vapors.

[0004] These multi-piece fluoropolymer containers are assembled using a plurality of pre-formed parts, i.e., a pouch member, a spout or neck member, a dispensing member, a handle member, etc. These parts are then mechanically attached and/or heat-sealed to one another using a post-molded welding process or other mechanical joining process that produces a weld or seam between the various parts. In the known manufacturing methods, two or more flat sheets of fluoropolymer film are joined together to form a "pouch" using a welding procedure where the film sheets are overlaid, one on top of the other, and several edges of the film are welded together to form a two dimensional pouch in a first step, and thereafter a second step is used to weld the neck or fitment to the bag.

[0005] A major disadvantage of the known fluoropolymer containers is the requirement of using a multi-step manufacturing process, where the thin walled pouch or bag portion of the container is formed during a first step, and in the second step, a pre-formed, relatively thick-walled material comprising a rigid neck, spout, fitment or other sealing or dispensing mechanism is then mechanically affixed or welded to the thin walled bag. Additionally, there are other shortcomings associated with the known fluoropolymer containers constructed using the multi-step method, which include: the increased cost and added time to manufacture and assemble the multi-piece body and spout combination, cross-contamination from handling during assembly, and seams which are prone to leak where assembly of the two components are joined together.

[0006] The present one-piece, blow molded container includes a fully-integrated bag and one or more rigid fitment, and is formed using a single step blow molding process, thus overcoming the deficiencies of the known thin-walled fluoropolymer containers by providing a container having both thin-walled and thick-walled portions created in a single continuous blow molding process, without the need for post-molded welding or other mechanical attachment of the various components of the container.

[0007] Other deficiencies that the present invention overcomes include product failure due to an incomplete weld or ruptured seam where the various components are attached and/or sealed, including situations where the thin-walled portion and the thick-walled portion are mechanically joined together. Conventional blow molded containers are also generally aesthetically inferior due to the welding operations and there is great contamination potential as a result of mechanically joining the separate parts to create a complete container. The present construction of the one-piece, continuously blow molded bag and one or more rigid fitment results in a complete, fully-integrated, contaminant-free, sealed, three-dimensional product having one or more thick-walled fitment which graduates downward to a thin film bag, which is ready to be filled with a selected material.

[0008] The inventors are unaware of any conventional one-piece, continuously blow molded, fluoropolymer containers, created using a single step blow molding process, which have an integrated thin-walled, flexible, fluoropolymer film bag portion and one or more rigid, thick-walled, rigid fitment formed from a fluoropolymer resin, which can be used for storage, transport and dispensing of liquid, gel, powder, and pelletized materials, as discussed herein.

SUMMARY OF THE INVENTION

[0009] The present invention includes a blow molded container, having a thin-walled, flexible film bag and one or more rigid, thick-walled fitment wherein the bag and the one or more rigid fitment are blow molded during a single, continuous blow molding process, from a continuous source of fluoropolymer material, to form a complete, one-piece, fully-integrated, three dimensional container. The container of the present invention has particular relevance to the storage, transportation, and dispersal of corrosive chemicals and/or hazardous materials and other materials, which may present a potential hazard or concern in their use and/or transportation. The blow molding process used to manufacture the present invention is unique in that it produces a single complete, three-dimensional container with a thin-walled film bag portion and one or more rigid, thick-walled fitment, without the need for a post-molded welds, seams or any other mechanical joining or engagement procedure to connect individual container parts, including the joining of thin-walled parts with thick-walled parts. The present invention blow molded container also allows for the variety of different sealing or dispensing mechanisms and additional features to be molded to the bag and/or fitment during the single blow molding process.
or may be adapted and used with the rigid thick-walled fitment depending upon the material to be stored in the bag. These additional features may include, for example, valves, fittings for attaching tubes, inserts, dip tubes, relief devices, measuring ports, measuring devices, electrical connections, and devices molded as one-piece to the bag to facilitate filling, dispensing, and mixing the contents stored in the bag.

It is therefore an object of the present invention to provide a one-piece, continuously blow molded container formed from a parison of fluoropolymer material, having a thin-walled, flexible bag portion and one or more rigid, thick-walled fitment for use in storing, transporting and dispersing corrosive, hazardous, and/or dangerous chemical materials.

A further object of the invention is to provide a one-piece, continuously blow molded fluoropolymer container, having a thin-walled, flexible bag portion and one or more rigid, thick-walled fitment, where the fitment includes a neck and an orifice.

Yet another object of the invention is to provide a one-piece continuously blow molded container, having a thin-walled, flexible bag portion and a rigid, thick-walled fitment, which is formed during a single blow molding process in the absence of any post-molded welds or mechanical attachment of the individual components of the container.

Another object of the invention is to provide a one-piece, continuously blow molded container, having a thin-walled, flexible bag portion, one or more rigid, thick-walled fitment, and a closure portion, all of which are formed during a single blow molding process which seals the container and prevents the introduction of contaminants within the one or more fitment and the thin-walled bag portion.

A further object of the invention is to provide a one-piece, continuously blow molded container, having a transition area existing between the thin-walled bag portion and the one or more thick-walled fitment.

An object of the invention is to provide a one-piece, continuously blow molded container, having a thin-walled, flexible bag portion and one or more rigid, thick-walled fitment, which is formed as a fully integrated container, wherein the container is constructed of a fluoropolymer material comprising ethylene-chlorotrifluoroethylene (E-CTFE).

Yet another object of the invention is to provide a one-piece, continuously blow molded container, wherein the single fluoropolymer parison comprises ethylene-chlorotrifluoroethylene (E-CTFE) and is extruded from a blow molding machine wherein a die of a head tooling of the blow molding machine and all of the wetted metallic pathway of the blow molding machine, through which a molten resin passes, comprises a low iron, high nickel content metallic material marketed under the trademarks INCONEL®, HASTELLOY®, MONEL® and DURANICKEL® and combinations thereof. Additionally, low iron, high nickel content metallic coatings may also be applied on the interior surface of a pair of mold halves used in the blow molding machine.

Further objects and advantages of this invention will become apparent in study of the following portion of the specification, claims and the attached drawings, or may be learned by the practice of the invention as set forth hereinafter.

DRAWINGS

The accompanying drawings which are incorporated into and constitute a part of this specification, illustrate a preferred embodiment of the invention and together with a general description of the invention given above and the detailed description of the preferred embodiment, and any alternative embodiment, given below serve to explain the principals of the invention. Understanding that these drawings depict only typical embodiments of the invention and are not therefore to be considered to be limiting of its scope, the invention will be described and explained with additional specificity and detail through the use of the accompanying drawings, in which:

FIG. 1 is a side view of the preferred embodiment one-piece, continuously blow molded container with one or more rigid fitment.

FIG. 2 is an enlarged, cross-sectional view of the rigid fitment of the preferred embodiment one-piece, continuously blow molded container, depicted in FIG. 1.

FIG. 3 is a cross-sectional view of the preferred embodiment one-piece, continuously blow molded container with rigid fitment, illustrated in FIG. 1.

FIG. 4 is a side view of the preferred embodiment one-piece, continuously blow molded container with one or more rigid fitment wherein the flexible bag portion includes a generally flat bottom.

FIG. 5 is a side view of the preferred embodiment one-piece, continuously blow molded container with one or more rigid fitment wherein the flexible bag portion includes a generally rounded bottom.

FIG. 6 is a side view of the preferred embodiment one-piece, continuously blow molded container which includes a plurality of rigid fitments which are all formed during the continuous blow molding process.

FIG. 7 illustrates a side view of the formation of the flexible, open-ended, tubular, molten parison being continuously extruded from the die of the head tooling of the blow molding machine and further illustrate the moveable mold halves which are located adjacent to the parison.

FIG. 8 illustrates a side view of a preferred embodiment one-piece, continuously blow molded container with a flexible film bag and one or more rigid fitment, which further illustrates a closure portion adjacent to the orifice of the fitment and the excess pressed, untrimmed fluoropolymer material attached to the side of the fitment, all illustrating what the finished, one-piece continuously blow molded container looks like after it has been removed from the mold halves.

FIG. 9 illustrates a drawing of a side view of a preferred embodiment one-piece, continuously blow molded container with a flexible film bag and one or more rigid fitment, wherein the container has been trimmed, the closure portion has been removed and the bag has been flattened for packing and shipment.

FIG. 10 illustrates a drawing of a preferred embodiment one-piece, continuously blow molded container with a flexible film bag and one or more rigid fitment wherein the material has been deposited within the container and a post-molded removable lid can thereafter be engaged with the fitment to seal the orifice.

FIG. 11 illustrates a cross-sectional drawing of a lid of the preferred embodiment one-piece, continuously blow molded container with a flexible film bag and one or more rigid fitment, illustrated in FIG. 10.

DETAILED DESCRIPTION OF THE INVENTION

The present invention one-piece, blow molded container 10 with one or more rigid, thick-walled, fitment 12 and
a thin-walled, flexible, film bag portion 14 as depicted in FIGS. 1-6, 9-10 is blow molded from a continuous source of fluoropolymer material, using a single blow molding process, to form the fully integrated, one-piece blow molded container 10 in the absence of any post-molded welds, seams, seals or other mechanical engagement means. The thin-walled, flexible, film bag portion 14 further includes a continuous wall 16 and a bottom portion 18. The bottom portion 18 can selectively be either flat as shown in FIGS. 1 and 4, or can be round as depicted in FIGS. 5 and 6.

The one or more fitment 12 of the present invention 10, further includes a neck 20 and an orifice 22. The orifice 22 has an outer diameter surface 24 and an inner diameter surface 26. The fitment 12 is blow molded simultaneously with the bag portion 14 as a single piece and the neck 20 is compression molded during the blow molding process. The bag portion 14 is formed from a fluoropolymer film. The fitment 12 includes a gradual and accumulated thickness of fluoropolymer resin molded as an extension of the bag 14, wherein both the bag 14 and fitment 12 are processed as a single container 10 wherein the fitment 12 has a greater wall thickness as compared to the relatively thin film thickness of the bag 14. The range of thickness of the fitment portion 12 between the outer diameter surface 24 and the inner diameter surface 26 is in the range of between 0.020 inch and 0.300 inch. The range of thickness of the thin-walled, film bag portion 14 is in the range of between 0.002 inch to 0.157 inch. The inner diameter surface 26 of the orifice 22 allows for the insertion of a valve, a shut-off valve, a dip tube, spout, inserts, ports or other dispensing device (not shown) to fit therein and selectively dispense a selected material 30 upon command and to generally prevent the unintended discharge of material from the container 10.

A transition area 28 is depicted in FIGS. 1 and 2, showing the area 28 where the thin wall 16 of the bag 14 meets and merges with the thicker wall fitment 12 without the need for post-molded welding. The transition area 28 is formed during the blow molding process. The thickness of the fitment 12 between the orifice 22 and the transition area 28 is of the range of between 0.020 inch and 0.300 inch.

As depicted in FIG. 6, the one-piece blow molded container 10 of the present invention includes one or more rigid fitment 12. Depending upon the specific application, the one-piece, blow molded container 10 could include any reasonable number of fitments 12, all of which would be compression molded during the same blow molding process in which the bag portion 14 is formed.

As depicted in FIG. 7, the blow molding process which creates the preferred embodiment one-piece container 10, includes a process in which the blow molding machine 34 converts cold, unfluorinated fluoropolymer pellets or powder 32 into a molten resin (not shown) by applying heat and back pressure to the fluoropolymer pellets or powder 32 and then extruding the molten resin (not shown) through a die (not shown) of a head tooling (not shown) of the blow molding machine 34 to form a flexible, open-ended, molten tube called a parison 36. The parison 36 is then captured between a pair of mold halves 38 by forcing the mold halves 38 to horizontally engage and contact one another and thereafter air or gas is introduced within the molten parison 36. The mold halves 38 can be constructed from metallic material marketed under the trademarks INCONEL®, HASTELLOY®, MONEL® or DURANICKEL® or a combination thereof, or alternatively, the interior sidewall 44 surfaces of the mold halves 38 can be coated with metallic material marketed under the trademarks INCONEL®, HASTELLOY®, MONEL® or DURANICKEL® or a combination thereof, or some other low iron, high nickel content metallic material. The introduction of air or gas into the parison 36 then "blows" the molten extrusion 36 to the sidewalls 44 of the mold halves 38, to generally form the shape of the container 10. The bag portion 14 has no pre-defined volume, shape or surface area, however the particular method of manufacturing will define these dimensions by selecting a specific mold along with selecting the particular process parameters to produce the one or more fitment 12 and the bag 14. The mold halves 38 can be designed to include fitment shaping in the mold halves 38 to form any reasonable number of fitments 12, desired. Additionally, the added features of fittings, ports, dip tubes, etc., (not shown) for inclusion in the bag 14 and/or fitment 12, can be formed during the blow molding process.

The type of blow molding process used to create the one-piece, container of the present invention 10 would be extrusion blow molding. This could be single-stage continuous extrusion, intermittent extrusion using a reciprocating screw or an accumulator. Injection blow molding, stretch blow molding, or injection stretch blow molding or extrusion stretch blow molding may also be implemented. The process is unique in the aspect that all metallic components within the blow molding machine 34 which contact the wetted path of molten resin (not shown) must be made from anticorrosive, low iron, high nickel content metallic materials. The die (not shown) or the head tooling (not shown) of the blow molding machine 34 and all of the wetted path of the blow molding machine 34, through which a molten resin (not shown) passes, may be constructed solidly from a low iron, high nickel content metallic material marketed under the trademarks INCONEL®, HASTELLOY®, MONEL® and DURANICKEL® and combinations thereof, or may have a high nickel content surface coating. Conventional blow molding machines have not, in the past, been constructed using anticorrosive, low iron, high nickel content metallic materials. The use of low iron, high nickel content metals are necessary to prevent iron corrosion in the molten resin (not shown) and the parison 36. Iron corrosion in the molten resin and/or parison 36 would also result in contamination by depositing metallic corrosion slag within the finished one-piece, blow molded container 10, which is not desirable. Another unique aspect of the blow molding process which forms the present invention one-piece, blow molded container 10 is that the heaters (not shown) used in the blow molding machine 34 must be of sufficient wattage to reach the necessary temperatures required for melting a high temperature fluoropolymer. The wattage of these heaters (not shown) is preferably a high wattage. The heaters (not shown) are also preferably insulated with ceramic jacketing (not shown) to maintain the temperature in the blow molding machine, in the range of between 400 degrees Fahrenheit and 750 degrees Fahrenheit, to sustain the fluoropolymer melt pool (molten resin) (not shown) without overheating the fluoropolymer. The process for producing this high purity, non-leaching, one-piece fluoropolymer container 10 must also utilize high purity tubing, tubing connectors, as well as a stainless steel blow pin; PFA lined braided hoses and filtered air for blowing the molten fluoropolymer parison 36 to the walls of the mold halves 38.

FIG. 8 illustrates a finished, fully formed, one-piece, blow molded container of the present invention 10 as it looks.
after it has been blow molded and removed from the mold halves 38. As discussed above, during the blow molding process, the mold halves 38 converge upon the molten parison 36 and air is introduced into the parison 36 through a die (not shown) in the head tooling (not shown) in the blow molding machine 34 to blow the parison 36 against an inner walls 44 of the mold halves 38. A top portion 40 of the parison 36 is compression molded during the blow molding process to form the thick-walled fitment 12 and is pinch welded within the mold halves 38 to form a closure portion 42 (initially seal the orifice 22 of the fitment 12. The thickness of the closure portion 42 may be in the range of between 0.002 inch to 0.157 inch. During the blow molding process, an excess of pressed fluoropolymer material 48 is formed adjacent to the fitment 12. Also, during the same blow molding process, a bottom portion 46 of the open-ended parison 36 is pinch welded 19 closed to seal the bottom 18 of the container 10 when the mold halves 38 converge upon the parison 36. In this manner, the one-piece blow molded container 10 is inflated with filtered air and sealed to prevent the introduction of contaminants within the fitment 12 and bag 14 of the one-piece, container 10.

[0037] FIG. 9 illustrates a finished, fully formed, one-piece blow molded container of the present invention 10 wherein the closure portion 42 and the excess pressed fluoropolymer material 48 has been removed. Additionally, the container 10 has been flattened for more efficient packing and shipment to the user.

[0038] FIG. 10 illustrates a partially filled one-piece blow molded container of the present invention 10 wherein a removable lid 50 can be selectively engaged to the fitment 12 to selectively seal, and selectively unseal, the orifice 22 to generally prevent the unintentional dispersal of corrosive chemicals or other substances and to allow for the intended dispersal of corrosive chemicals and other substances. The removable lid 50 further includes an annular rib 54. When it is desired that the lid 50 engage and seal the orifice 22, pressure on the lid 50 causes the rib 54 to slide over and engage a lip 52 on the outer diameter surface 24 of the neck 20 of the fitment 12. The lid 50 can be formed of any polymer or fluoropolymer material. Once the closure portion 42 has been removed, the selected material 30 can be delivered into the orifice 22 of the fitment 12 and conveyed through the neck 38, and retained within, the internal area or portion 13 of the flexible bag 14 of the container 10. The fitment 12 serves as a conduit from the orifice 22 to the internal portion 13. Thereafter, the lid 50 can be used to seal the orifice 22 to retain the corrosive chemicals or other materials deposited into the container 10 to prevent unintentional dispersal, or alternatively, any one or a number of various dispensing devices (not shown) can be inserted within the orifice 22 and engaged to the inner diameter surface 26 or the outer diameter surface 24 of the fitment 12. FIG. 11 illustrates a cross-sectional view of the lid 50.

[0039] The thin-walled flexible bag 14 and one or more rigid thick-walled fitment 12 of the present invention 10 can be constructed from a variety of fluoropolymers, including, for example, ethylene-chlorotrifluoroethylene (E-CTFE), tetrafluoroethylene (MFA), perfluoroalkoxy (PFA), polypivalidone fluoride (PVDF), fluorinated ethylene propylene (FEP), polytetrafluoroethylene (PTFE), fluororylpropylene, and modified variations and combinations thereof. Ethylene-chlorotrifluoroethylene (E-CTFE), or alternatively perfluoroalkoxy (PFA), may provide the optimum chemical and mechanical properties needed for most material storage, transportation and dispensing applications, as discussed herein. The physical properties of fluoropolymers not including ethylene-chlorotrifluoroethylene (E-CTFE) and perfluoroalkoxy (PFA), may cause the blow molded container 10 to be more susceptible to stress cracking, and thereby less useful for material storage. As a fluoropolymer, E-CTFE is a tenacious, light weight, ultra-pure fluoropolymer material, which is also highly resistant to most environmental conditions, including but not limited to the following selected materials 30: corrosive chemicals and organic solvents, strong acids, alkaline, peroxide and semi-conductor 1 (SC1) and semi-conductor 2 (SC2) chemicals, and aqueous caustics for handling wet or dry chlorine, bromine, and other halogens. Ethylene-chlorotrifluoroethylene (E-CTFE) and perfluoroalkoxy (PFA) tolerate cryogenic to elevated temperature environments without affecting physical or chemical properties. Thus, the preferred embodiment one-piece, blow molded bag and fitment container 10 is preferably constructed of E-CTFE, and may secondarily be constructed of PFA. The specific gravity of E-CTFE (spg up to 1.76) is favorable for constructing a single container 10 having a thin wall section 16 and one or more thick-wall fitment section 12. The use of other fluoropolymers for this application may be disadvantageous in that the specific gravity of other fluoropolymers (spg range up to 2.17) is heavier as compared to E-CTFE.

[0040] The volume or size of the blow molded container of the present invention 10 can vary from 100 cc to 20 liters, or more. The bag 14 and fitment 12 combination can be molded as a single layer film, but could also be molded as a multi-layer film with any of the above-described fluoropolymer resins or other commodity plastic resins or engineering polymers. The blow molded container 10 and one or more rigid fitment 12 can be used by itself to store, transport and dispense materials or it can also be used as a liner with a reusable overpack or crate (not shown), each having an internal compartment in which the blow molded container 10 can be secured for transportation. When the container 10 is emptied, it can then be removed from the overpack or crate (not shown) for disposal and/or recycling. The one-piece container of the present invention 10 acts as a barrier between the container contents and the overpack or crate (not shown), to prevent corrosion, contamination, spillage, to improve safety handling, and to preserve product integrity for the contained material. The fluoropolymer construction of the container 10 allows for little to no leaching of the container’s polymeric chemical composition into the selected material 30, as well as superior barrier properties to prevent the contents from leaching out of the container into the atmosphere. Depending upon the chemical contained within the container 10, the blow molded container may not be suitable for recycling and may require disposal after a single use.

[0041] The advantage of the blow molding process for this application to construct the one-piece thin-walled bag 14 and one or more thick-walled fitment 12 of the present invention 10 is that it can produce a fully-integrated, complete container 10 using a one-step procedure to form a complete three dimensional bag and fitment combination using the E-CTFE material, or alternatively PFA. The known art does not include, suggest or teach the use of E-CTFE or PFA with this one-step process due to the high molecular weight of the resin in its molten form. An additional advantage of using E-CTFE, or alternatively PFA, with the blow molding process
is that this process can be performed within a small workspace. Additionally, this blow molding process can be clean room certified in order to reduce, or eliminate, cross-contamination caused by the requirement of additional steps for assembly of the components (multiple step assembly). This blow molding process provides the additional advantage of structural integrity to the finished product container 10 by eliminating seams and welds, which are common when using multiple step assembly.

[0042] The design of the one-piece blow-molded container 10 facilitates a quick single-use package for corrosive/high purity chemicals at a lower cost and superior performance to a non-E-CTFE or non-PFA blow molded container product that is constructed by welding a two dimensional film pouch from one or more flat sheets of fluoropolymer which is then heat sealed to a pre-formed fitment. The one-piece, blow-molded, fully integrated E-CTFE container 10 of the present invention is designed to facilitate leak-free shipping and end-use packaging for a variety of users, including but not limited to chemical manufacturers. Cross contamination from reused packaging is eliminated. The use of the E-CTFE fluoropolymer provides the advantages of the fluoropolymer barrier characteristics for use in transporting and dispensing hazardous chemicals as well as the capabilities to withstand high to low temperatures repeatedly in freeze to thaw applications. The use of the E-CTFE fluoropolymer in a blow molded process is a cost effective way to produce high volume products with minimal space and labor requirements.

[0043] The present invention one-piece, container 10 is generally of monolithic construction that exhibits a predominantly thin-walled bag 14 having one or more thick-walled fitment 12. The thin-walled bag 14 has an internal portion 13 for ingress, storage and egress of corrosive chemicals, and an external outer surface 15. The outer surface 15 is designed to be retained within and make contact with an overpack (not shown). The container 10 is preferably formed of thermoplastic fluoropolymer and can be manufactured outside of a clean room environment. Despite the that the container 10 is not required to be manufactured in a clean room environment, the container 10 exhibits an internal purity level of less than 15 C/ml particle contamination in high purity water and high purity solvents or resulting in any trace metals detected within the container leaching into the solvents after storage of 60 days without secondary cleaning, washing or rinsing. The container 10 can be exposed to 25 Kgy of gamma radiation with no loss in physical properties. The optical clarity of the thin-walled bag 14 of the container 10 has a haze number of less than 1.5% and a luminous light transmittance of 93%. The optical clarity of the container 10 is similar to the optical clarity of borosilicate glass. The container 10 can be manufactured in a variety of sizes and volumes, with a maximum volume of up to 4 liters. The high purity, thin-walled container 10 demonstrates low permeation rates to water vapor, oxygen and CO2.

[0044] The present invention one-piece, fully integrated, blow-molded container 10 overcomes the deficiencies of the known containers used to store and transport various chemical materials and is formed during a single blow molding process without the use of post-molded seams, welds, seals or other connection means which are necessary in the known fluoropolymer containers.

[0045] It will be appreciated that these and other embodiments may be provided for a one-piece, fully integrated blow molded fluoropolymer container 10, having a thin-walled, film bag portion 14 and a thick-walled fitment portion 12. Additional embodiments become readily apparent in view of the present invention as described herein above. Having described the invention above various modifications of the techniques, procedures and materials will be apparent to those skilled in the art. It is intended that all such variations within the scope and spirit of the appended claims be embraced thereby.

What is claimed is:

1. A container, comprising:
   a thin-walled, bag, wherein said bag includes a wall comprised of flexible fluoropolymer film, said bag having an internal portion for storage of corrosive chemicals, and an external outer surface;
   one or more rigid, thick-walled fitment, said fitment being a unitary member of the bag, said fitment having a neck and an orifice, wherein the fitment serves as a conduit from the orifice to the internal portion;
   a transition area in said thin-walled bag, said transition area being comprised of intermediate thickness fluoropolymer film and located between the thin-walled bag and the one or more rigid fitment;
   a closure portion, wherein said closure portion initially seals the orifice; and
   a removable lid for selective engagement to the orifice of the fitment, to selectively seal and unseal the orifice.

2. The container of claim 1, wherein the fitment selectively allows for corrosive chemicals to ingress into the internal portion and selectively allows for corrosive chemicals to egress from the internal portion.

3. The container of claim 2, wherein the closure portion is selectively removed to allow for the filling of the container wherein a quantity of corrosive chemical is deposited within the orifice and is transmitted to, and retained within, the internal portion of thin-walled bag.

4. The container of claim 3, wherein the removable lid is selectively engaged to the orifice to retain the corrosive chemicals within the thin-walled bag and to generally prevent unintentional dispersal of the corrosive chemicals.

5. The container of claim 4, wherein the flexible fluoropolymer film, further comprises ethylene-chlorotrifluoroethylene (E-CTFE).

6. The container of claim 5, wherein said container has an internal purity level of less than 15 C/ml particle contamination.

7. The container of claim 5, wherein said container has an optical clarity with a haze number of less than 1.5% and a luminous light transmittance of 93%.

8. The container of claim 5, wherein the fitment of said container may be adapted for use with a dispensing device.

9. The container of claim 5, wherein the thickness of fluoropolymer film comprising the fitment is in the range of between 0.020 inch and 0.300 inch.

10. The container of claim 5, wherein the thickness of fluoropolymer film comprising the thin-walled bag is in the range of between 0.002 inch and 0.157 inch.

11. The container of claim 5, wherein the thickness of fluoropolymer film comprising the orifice is in the range of between 0.020 inch and 0.157 inch.

12. A container, comprising:
   a thin-walled bag, wherein said thin-walled bag has an internal portion and an external portion,
17. A container, comprising:
a thin-walled structure, wherein said thin-walled structure
has an internal portion and an external portion;
a thick-walled fitment engaged to said thin-walled struc-
ture;
a transition area between the thin-walled structure and the
thick-walled fitment;
a closure portion, wherein said closure portion initially
seals the orifice; and
a removable lid for selective engagement to the orifice to
selectively seal, and unseal, the fitment.

13. The container in claim 12, wherein said container is
comprised of a flexible fluoropolymer film.

14. The container of claim 13, wherein flexible fluoropoly-
mer film, further comprises ethylene-chlorotrifluoroethylene
(E-CTFE).

15. The container of claim 14, wherein a corrosive chemi-
cal may be delivered to the orifice of the fitment and thereafter
said corrosive chemical is conveyed into the orifice and
through a neck of the fitment, and said corrosive chemical is
retained within the internal portion of the thin-walled bag.

16. The container of claim 15, wherein the fitment of said
container is adapted for use with a dispensing device to selec-
tively dispense corrosive chemicals.