Title: MATERIAL FOR PACKING PURPOSES

Abstract: The present invention relates to material for packing purposes, which material comprises a first layer, which is heat-resistant, and a second layer, which is heat-sealable, wherein said material comprising a coextruded laminate, where said coextruded laminate comprises polycarbonate and amorphous polyester, wherein said polycarbonate having a melt flow index in the interval from 1.5 to 10.0 and said amorphous polyester having an intrinsic viscosity in the interval from 0.5 to 0.8.
Material for packing purposes

TECHNICAL FIELD
The present invention relates to a material for packing purposes, which material comprises a first layer, which is heat-resistant, and a second layer, which is heat-sealable, wherein said material comprising a coextruded laminate, and to a process for producing such a material. The invention furthermore relates to a process for packing and to a process for thermoforming using a material in accordance with the present invention.

STATE OF THE ART
Materials for packing purposes, which materials exhibit heat-resistance at the same time as heat-sealability, have been disclosed previously. In these materials, the heat resistance has usually been obtained by using orientated films, such as orientated polyester, orientated polypropylene or orientated polyamide, or lacquers of different types, or else heat resistance has been achieved by means of electron crosslinking. The previous methods of obtaining heat resistance require an additional fabrication step when producing material for packing purposes. Some of the methods involving an additional fabrication step give rise to impaired optical properties while others, for example the lacquer method, give rise to impaired heat transition in the case of thick laminates. Furthermore, in order to produce materials which exhibit heat resistance at the same time as heat sealability, a component which provides heat resistance is combined with a component which provides heat sealability. Since the component in the combination which provides said material with heat resistance has, in previous methods, usually belonged to another polymer family than that of the component which provides heat sealability, the combination has made it more difficult to recover previous materials.
JP 07-186318 describes a coextruded laminate for packing purposes, which laminate consists of a heat-sealing layer and a layer for preventing crack formation, wherein the heat sealing layer consisting of polyester and the layer for preventing crack formation consisting, for example, of polycarbonate. A "layer for preventing crack formation" is understood here as meaning a layer which exhibits a negligible stretching and which thereby prevents crack formation in a barrier layer which has been deposited on the layer. While it is true that the coextruded laminate in JP 07-186318 provides a combination which is suitable as far as recovery is concerned, JP 07-186318 does not provide a coextruded laminate which exhibits heat resistance and heat sealability at the same time as the constituent components are thermoformable simultaneously.

ACCOUNT OF THE INVENTION

The present invention relates to a material for packing purposes, which material comprises a coextruded laminate, wherein said material exhibiting heat resistance at the same time as heat sealability and also good optical properties in the form of high transparency and brightness.

The present invention furthermore relates to a material for packing purposes, which material comprises a coextruded laminate, wherein said material exhibiting heat resistance at the same time as heat sealability, and wherein the constituent components of the coextruded laminate being thermoformable simultaneously and providing process advantages in the form of improved heat transition in the coextruded laminate.

The present invention relates to a material for packing purposes, which material comprises a first layer, which is heat-resistant, and a second layer, which is heat-sealable, wherein said material comprising a coextruded laminate, which coextruded laminate comprises polycarbonate and amorphous polyester, wherein said polycarbonate having a melt flow index
in the interval from 1.5 to 10.0 and said amorphous polyester having an intrinsic viscosity in the interval from 0.5 to 0.8.

Said material is expediently a flexible material in film or foil form which is useful in packing, for example in packing comprising the use of welding tools such as heated gripper jaws or other energy-transferring tools.

In addition, said material exhibits a first layer, which is heat-resistant, and a second layer, which is heat-sealable, wherein, when, for example, welding tools such as heated gripper jaws are used, said first layer remaining tack-free at the same time as said second layer is heat-sealed to an object. A layer which is heat-resistant is defined here as being a layer which remains tack-free up to approx. 180°C, and a layer which is heat-sealable is defined here as being a layer which has a Tg temperature (glass transition temperature) of about 85°C. Said object is, for example, made of the same material as said second layer, for example amorphous polyester.

Said material comprises a coextruded laminate, wherein said laminate preferably being coextruded by means of single-slot coextrusion.

Said coextruded laminate furthermore comprises polycarbonate and amorphous polyester wherein said polycarbonate having a melt flow index in the interval from 1.5 to 10.0 and said amorphous polyester having an intrinsic viscosity in the interval from 0.5 to 0.8.

Said polycarbonate consists of thermoplastic, aromatic polymers of high molecular weight and comprises homopolycarbonates, copolycarbonates and mixtures thereof. Said polycarbonate furthermore has an average molecular weight of from about 8000 to more than 200,000.
Said polyester can be a polyester having a high molecular weight, wherein high molecular weight signifying a polyester which has an intrinsic viscosity (I.V.) of from about 0.5 to about 1.10, preferably to 0.8, which I.V. is measured in a solution which is 60/40, with respect to volume, of phenol/tetrachloroethane at 30°C. Said polyester can alternatively be defined by a density which is about 1.361 grams per cubic centimetre or less.

Another embodiment relates to a material according to the present invention in which the thickness of said polycarbonate layer is in the interval from approx. 2 to 30 μ, and the thickness of said amorphous polyester layer is in the interval 20-1000 μ.

Yet another embodiment relates to a material according to the present invention in which said first layer consists of said polycarbonate and said second layer consists of said amorphous polyester.

Another embodiment relates to a material according to the present invention in which said material exhibits a third layer, which forms a gas and/or vapour barrier. Said third layer, which forms a gas and/or vapour barrier, can, for example, be ethyl vinyl alcohol or polyamide.

Yet another embodiment according to the present invention relates to a material in which said third layer is formed from a coextruded substance having gas and/or vapour barrier properties in said coextruded laminate. Said coextruded substance having gas and/or vapour barrier properties is preferably ethyl vinyl alcohol.

Another embodiment according to the present invention relates to a material, wherein said material, from said first layer to said second layer, comprising a coextruded laminate consisting of polycarbonate, amorphous polyester, ethyl
vinyl alcohol and amorphous polyester. Where appropriate, polyethylene can be laminated on if sealability to PE systems is desired. When polyethylene is laminated onto said material, it can expediently be laminated on in a layer having a thickness of from 20 to 60 μ.

A process for producing material according to the present invention is also included, wherein said material being coextruded in a single-slot extruder.

The present invention also relates to a process for packing, wherein a material which has been described here being used for said process.

Another embodiment according to the present invention relates to a process for packing in which a material which has been described here is used, wherein it being possible for said polycarbonate to be thermoformed at the same time as the amorphous polyester which is included in said material.

Yet another embodiment according to the present invention relates to a process for packing in which a material which has been described here is used, in which process a layer of amorphous polyester in the coextruded laminate is heat-sealed, where appropriate after thermoforming together with the layer of polycarbonate, to compatible material, for example a packing trough. In said process, the layer of polycarbonate, which is heat-resistant, serves as a heat transition layer and a pressure-distributing layer.

The present invention furthermore relates to a process for thermoforming in which a material which has been described here is used, wherein said polycarbonate being thermoformed at the same time as the amorphous polyester which is included in said material.

PREFERRED EMBODIMENTS

Implementation Example 1
The two components, polycarbonate which has a melt flow index in the interval from 1.5 to 10.0 and amorphous polyester which has an intrinsic viscosity in the interval from 0.5 to 0.8, are melted separately. After that, the melted components are coextruded, at an extrusion temperature of 270°C, in a single-slot extruder using conventional methodology, wherein coextruded laminates being obtained which consist of a layer of polycarbonate and a layer of amorphous polyester. The thickness of the polycarbonate layer is optionally in the interval from 2 to 30 µ and the thickness of the amorphous polyester layer is in the interval from 20 to 1000 µ.

The layer of polycarbonate remains tack-free towards currently available sealing jaws up to approx. 180°C and thereby exhibits the desired heat resistance. The layer of amorphous polyester has a Tg temperature (glass transition temperature) of about 85°C and thereby exhibits the desired heat sealability. Furthermore, as a result of the choice of the melt flow index for said polycarbonate and the choice of the intrinsic viscosity for said amorphous polyester, the components which are included in the coextruded laminate exhibit the unique property of being thermoformable simultaneously.

Implementation Example 2
In addition to the components used in Implementation Example 1, polycarbonate which has a melt flow index in the interval from 1.5 to 10.0 and amorphous polyester which has an intrinsic viscosity in the interval from 0.5 to 0.8, ethyl vinyl alcohol is also used in this example, wherein all the components being melted separately. After that, the melted components are coextruded, at an extrusion temperature of approx. 240-270°C, in a single-slot extruder using conventional methodology, wherein coextruded laminates consisting, in the following order, of a layer of polycarbonate, a layer of amorphous polyester, a layer of ethyl vinyl alcohol and an additional layer of
amorphous polyester being obtained. The thickness of the polycarbonate layer can optionally vary in the interval from 2 to 30 μ, whereas the two amorphous polyester layers can optionally have a thickness of approx. 100 μ, and the ethyl vinyl alcohol layer can have a thickness of approx. 2 μ.

The layer of polycarbonate remains tack-free towards currently available sealing jaws up to approx. 180°C and exhibits the desired heat-resistance, and the layers of amorphous polyester have a Tg temperature (glass transition temperature) of about 85°C, wherein it in the present case being the second layer of amorphous polyester which exhibits heat sealability. The layer of ethyl vinyl alcohol forms a gas and/or vapour barrier in the coextruded laminates. Furthermore, as a result of the choices of the melt flow index for said polycarbonate, of the intrinsic viscosity for said amorphous polyester and of a barrier layer, the components which are included in the coextruded laminate exhibit the unique property of being thermoformable simultaneously.

Implementation Example 3
In addition to the components used in Implementation Example 2, polyethylene is also used in this present example, and the same conventional methodology as in Implementation Example 2 is employed for the coextruded laminate consisting, in the following order, of a layer of polycarbonate, a layer of amorphous polyester, a layer of ethyl vinyl alcohol and a second layer of amorphous polyester. The layer of polyethylene is a layer which is applied using a conventional lamination technique. The polyethylene layer has a thickness of approx. 40 μ and the other layers have thicknesses, properties and functions in accordance with the corresponding layers in Implementation Example 2. The polyethylene layer exhibits sealability to PE systems and can also provide a peel effect, i.e. packings which comprise a peel effect can be torn open.
Furthermore, as a result of the choices of the melt flow index for said polycarbonate, of the intrinsic viscosity for said amorphous polyester, of a barrier layer and of the layer which exhibits sealability to PE systems, the components which are included in the coextruded laminate exhibit the unique property of being thermoformable simultaneously.
PATENT CLAIMS

1. Material for packing purposes, comprising a first layer, which is heat-resistant, and a second layer, which is heat-sealable, wherein said material comprising a coextruded laminate, characterized in that said coextruded laminate comprises polycarbonate and amorphous polyester, wherein said polycarbonate having a melt flow index in the interval from 1.5 to 10.0 and said amorphous polyester having an intrinsic viscosity in the interval from 0.5 to 0.8.

2. Material according to Patent Claim 1, characterized in that the thickness of said polycarbonate layer is in the interval from approx. 2 to 30 µ and the thickness of said amorphous polyester layer is in the interval 20-1000 µ.

3. Material according to Patent Claim 1 or 2, characterized in that said first layer consists of said polycarbonate and that said second layer consists of said amorphous polyester.

4. Material according to any one of Patent Claims 1 to 3, characterized in that said material exhibits a third layer which forms a gas and/or vapour barrier.

5. Material according to Patent Claim 4, characterized in that said third layer is formed from a coextruded substance having gas and/or vapour barrier properties in said coextruded laminate.

6. Material according to any one of the preceding patent claims, characterized in that said material, from said first layer to said second layer, comprises a coextruded laminate consisting of polycarbonate, amorphous polyester, ethyl vinyl alcohol and amorphous polyester.
7. Material according to any one of the preceding patent claims, characterized in that a layer of polyethylene is laminated onto said material, wherein said layer having a thickness of from 20 to 60 μ.

8. Process for producing a material according to any one of the preceding patent claims, characterized in that said material is coextruded in a single-slot extruder.

9. Process for packing, characterized in that a material according to any one of Patent Claims 1 to 7 is used for said process.

10. Process for packing according to Patent Claim 8, characterized in that said polycarbonate can be thermoformed at the same time as amorphous polyester which is included in said material.

11. Process for packing according to Patent Claim 9 or 10, characterized in that a layer of amorphous polyester in the coextruded laminate is heat-sealed, where appropriate after thermoforming together with the layer of polycarbonate, to compatible material, for example a packing trough.

12. Process for thermoforming, characterized in that a material according to any one of Patent Claims 1 to 7 is used, wherein said polycarbonate being thermoformed at the same time as the amorphous polyester which is included in said material.
# INTERNATIONAL SEARCH REPORT

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC7: B32B 27/36, B65D 65/40  
According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  

IPC7: B32B  

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  

SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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| X         | JP 7186318 A (DAINIPPON PRINTING CO LTD)  
| A         | US 4708896 A (AKAO), 24 November 1987 (24.11.87), column 7, line 14 - line 22 | 1-12 |

Further documents are listed in the continuation of Box C.  

* Special categories of cited documents:  
  "A" document defining the general state of the art which is not considered to be of particular relevance  
  "E" earlier application or patent but published on or after the international filing date  
  "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)  
  "O" document referring to an oral disclosure, use, exhibition or other means  
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Date of the actual completion of the international search  

28 November 2001  

Date of mailing of the international search report  

03-17-2001

Authorized officer  

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