A packaging laminate (10) for a retortable packaging container of the type which is produced by fold forming and thermosealing of a web or a prefabricated blank of the packaging laminate. The packaging laminate (10) includes a base layer (11) of paper or paperboard which has been rendered hydrophobic by stock sizing. The base layer (11) is preferably rendered hydrophobic by stock sizing by means of an aqueous dispersion or emulsion of an alkyl ketene dimer or mixture of alkyl ketene dimers with a different number of carbon atoms in their respective fat tails. Most preferably, the base layer (11) is rendered hydrophobic by stock sizing by means of an aqueous dispersion or emulsion of an alkyl ketene dimer containing 18 carbon atoms in its fat tail. The quantity of alkyl ketene dimers is suitably at least approx. 0.25 weight %, preferably 0.25-0.4 weight %, most preferably approx. 0.4 weight %, calculated on the dry weight of the base layer (11).
PACKAGING LAMINATE FOR A RETORTABLE PACKAGING CONTAINER

TECHNICAL FIELD

[0001] The present invention relates to a packaging laminate comprising a base layer of paper or paperboard for a retortable packaging container.

BACKGROUND ART

[0002] A packaging laminate of the type which is described above is known from int.al. international patent application carrying publication number WO97/02140. The prior art packaging laminate has a rigid, but foldable base or core layer of paper or paperboard and outer, liquid-tight coatings of a heat resistant plastic on both sides of the base layer. Between the base layer and one of the two outer plastic coatings, there may moreover be provided a gas barrier, e.g. an aluminium foil, in order to impart to the packaging laminate tightness properties also against gases, in particular oxygen gas.

[0003] Similar packaging laminates are also described in international patent applications WO97/02181 and WO98/1680.

[0004] From the prior art packaging laminates, finished packaging containers are produced with the aid of modern packing and filling machines of the type which, either from a web or from prefabricated blanks of the packaging laminate, both form, fill and seal finished packages. From, for example, a blank a packaging container is produced in that the blank is first formed into a tubular container capsule in that both longitudinal edges of the blank are folded towards and permanently united with one another by thermosealing in a so-called overlap joint which extends all the way between both open ends of the tubular container capsule. The one end of the container capsule is thereafter given a substantially planar end closure (bottom) by fold forming and thermosealing of adjacent end panels of the container capsule. The thus end sealed (provided with a bottom) container capsule is filled with the desired contents, e.g. a food, through its other, open end which, after the filling operation, is given a similarly substantially planar end closure (top) by a final fold forming and thermosealing of the corresponding end panels of the filled container capsule.

[0005] It has long been known that the shelf life of a food may be extended in that the food is subjected to a heat treatment which is so extensive that bacteria, fungi and other undesirable microorganisms existing in the food are exterminated, neutralised or reduced. In order to achieve complete sterilisation, this heat treatment must be carried out under such conditions that all parts of the treated food are heated to such an elevated level and for such a lengthy period of time as are required to ensure a complete destruction or deactivation of the microorganisms in the food.

[0006] A shelf-life extending heat treatment of a packed food is generally carried out in a retort which is an apparatus comprising a closed treatment chamber in which both temperature and pressure may be regulated and controlled during the heat treatment. Preferably, such a heat treatment or retorting is carried out in the manner and under the conditions which are described in greater detail in international patent application carrying publication number WO98/16431, which is hereby incorporated as reference. Filled packaging containers are placed in the treatment space of the retort, whereas a gaseous heating medium, e.g. hot steam, is caused to flow in contact with the outer walls of the packaging containers for heating the packed food to a previously selected treatment temperature which generally lies within the range of between 70 and 130°C. The packed food is kept at this temperature for a predetermined sufficiently long time so as to ensure as good as total thermal destruction of the microorganisms present in the food. The treated food is thereafter cooled with a coolant, e.g. cold water, down to a temperature close to or somewhat above the ambient temperature, i.e. 25-30°C, whereas the treatment is discontinued and the packaging containers are removed from the retort.

[0007] Different foods require different forms of treatment in order to achieve complete sterility by a heat treatment in a retort. For certain foods, more extensive heat treatment is required, i.e. more elevated treatment temperature and/or longer treatment time than for other foods which only require a shorter stay time at a relatively low treatment temperature in order to achieve the contemplated sterility.

[0008] A packaging container of the above-described known packaging laminate is generally sufficiently mechanically strong and stable to withstand such a relatively gentle or less extensive heat treatment, but, on the other hand, it is not seldom occurs that the prior art packaging containers are damaged or destroyed and even become totally unusable if the heat treatment is carried out at a relatively elevated treatment temperature and/or during a relatively lengthy treatment time which may occasionally be necessary to ensure complete and total sterility in certain types of foods.

[0009] One problem which is often observed in connection with such extreme, severe heat treatment is that liquid or moisture tends to penetrate into the paper or paperboard layer of the packaging container in areas where incision edges of the paper or paperboard layer are more or less freely exposed to the gaseous heating medium, e.g. hot steam. An example of such a particularly moisture and heat-sensitive area of the packaging container is along the freely exposed incision edge which extends all way between both ends of the tubular container capsule, i.e. the top and bottom of the packaging container. This penetration of moisture or liquid may, in particularly serious cases, entail that the packaging wall swells and delaminates and thereby becomes unattractive or wholly unusable for further handling.

[0010] Previous attempts to solve the above described problem with moisture and liquid absorbing incision edges have taken as their point of departure to protect or cover these edges either chemically by impregnation with a water-repellent or mechanically by slicing and refolding, as described in international patent application carrying publication number WO98/1680. While both of these prior art methods solve the problem inherent in moisture and liquid penetration, they require at least one extra operation and thereby associated extra equipment during the production of the packaging laminate.

[0011] One object of the present invention is therefore to obviate the above-discussed drawbacks in connection with the prior art technology.
Another object of the present invention is to provide a packaging laminate for a packaging container which reliably withstands a heat treatment in a retort without the risk of being damaged because of penetrating moisture or liquid, even if the heat treatment is carried out at an elevated treatment temperature and/or during a lengthy treatment time in a retort.

These and other objects are attained according to the present invention in that the packaging laminate described by way of introduction has been given the characterising feature as set forth in appended claim 1.

Advantages and expedient embodiments of the packaging laminate according to the present invention have further been given the characterising features as set forth in the appended subclaims.

SUMMARY OF THE INVENTION

According to the present invention, a packaging laminate is thus provided for a retortable packaging container including a paper or paperboard layer which has been rendered hydrophobic by stock sizing.

Since a paper or paperboard layer rendered hydrophobic by stock sizing already from the outset has sufficient tightness properties against moisture and liquid, the hydrophobic paper or paperboard layer in the packaging laminate according to the present invention requires neither extra chemical nor mechanical agents in order to protect the exposed incision edges. Consequently, the packaging laminate according to the present invention may be produced in a simple manner employing already existing conversion equipment without the employment of extra operational steps and associated extra equipment during the production of the packaging laminate.

The paper or paperboard layer rendered hydrophobic may, according to the present invention, be produced by stock sizing by means of alkyl ketene dimers dispersed or emulsified in aqueous solution. In practical examples, such aqueous dispersions or emulsions contain alkyl ketene dimers with 16-22 carbon atoms in their fat tail.

In a particularly preferred embodiment according to the present invention, the packaging laminate includes a paper or paperboard layer which has been rendered hydrophobic by means of an aqueous dispersion or emulsion of an alkyl ketene dimer which has a fat tail of 18 carbon atoms. An aqueous dispersion or emulsion of an alkyl ketene dimer with 18 carbon atoms makes possible not only a high absorption of the alkyl ketene dimer in the paper pulp and thereby a high closure of the pores (hydrophobic) in the produced paper or paperboard layer, but this desired high absorption may be carried out without impeding the subsequent handling and processing of the paper pulp in the paper machine.

Preferably, the paper or paperboard layer in the packaging laminate according to the present invention includes an alkyl ketene dimer in a quantity which is greater than approx. 0.25 weight %, calculated on the dry weight of the paper or paperboard layer. Expressed otherwise, the quantity of alkyl ketene dimer should preferably be greater than 2.5 kg per tonne of paper or paperboard, but should not be greater than approx. 4 kg which is a maximum permitted quantity for use in food contexts.

The present invention will be described in greater detail hereinbelow, with reference to the accompanying drawing, in which:

FIG. 1 schematically shows a cross section of a packaging laminate in its simplest embodiment according to the present invention; and

FIG. 2 shows the packaging laminate according to one preferred practical embodiment of the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

FIG. 1 thus schematically shows a cross section of a packaging laminate in its simplest embodiment of the present invention. The packaging laminate with the generic reference numeral 10 includes a base or core layer 11 of paper or paperboard and outer, liquid-tight coatings 12 and 13 of a thermosealable plastic on both sides of the base layer 11.

The base layer 11 has been rendered hydrophobic by stock sizing by means of an aqueous dispersion or emulsion of an alkyl ketene dimer or a mixture of alkyl ketene dimers of varying numbers of carbon atoms in their respective fat tails, preferably between 16 and 22 carbon atoms. In one particularly preferred embodiment, the base layer 11 has been rendered hydrophobic by stock sizing by means of an aqueous dispersion or emulsion of an alkyl ketene dimer with 18 carbon atoms in its fat tail.

The quantity of alkyl ketene dimers in the base layer 11 may vary, but is preferably at least approx. 0.25 weight % calculated on the dry weight of the base layer. In such cases where the packaging laminate 10 according to the present invention is intended to be employed in connection with a food, the quantity of alkyl ketene dimer should not, however, exceed 0.4 weight % calculated on the dry weight of the base layer 11. Expressed otherwise, the quantity of alkyl ketene dimer is preferably 2.5-4 kg/tonne of paper or paperboard in the dry base layer 11.

The material in the two outer liquid-tight coatings of plastic 12 and 13 is preferably thermosealable plastic in order to make for a rational production of finished retortable packaging containers. Examples of such thermosealable plastics for use in the two outer liquid-tight coatings 12 and 13 include, but are not limited to, polyethylene (PE), polypropylene (PP), polyester (PET) and copolymers thereof. Examples of a usable polyethylene plastic may be a high density polyethylene (HDPE) or a linear low density polyethylene (LLDPE), and example of a usable polyester plastic may be an amorphous polyester (APET).

FIG. 2 shows a schematic cross section of a packaging laminate according to one preferred embodiment of the present invention. The packaging laminate with the generic reference numeral 20 has a base layer 21 of paper or paperboard and outer, liquid-tight coatings 22 and 23 on both sides of the base layer 21.

The packaging laminate 20 further displays a gas barrier 24 between the base layer 21 and one of the two outer liquid-tight coatings 22.
Between the liquid-tight coating 22 and the gas barrier 24, there is a layer 25 of an adhesive by means of which the liquid-tight coating 22 is bonded to the gas barrier 24.

[0030] Between the gas barrier 24 and the base layer 21 there is a layer 26 of a lamination or sealing agent of such a nature that the gas barrier 24 is bonded to the core layer 21 with sufficiently strong and stable bonding strength so as not to be weakened or lost entirely when the packaging laminate 20 is exposed to extremely elevated temperature stresses, i.e., temperatures of up to approx. 130° C. or higher.

[0031] The outer, liquid-tight coating 23 on the other side of the base layer 21 may display decorative art work 27 of a suitable printing ink which in its turn is protected by a transparent layer 28, applied above the decorative art work 27 and consisting of suitable lacquer or other agent so as to protect the decorative art work 27 against attack from outside.

[0032] In order to impart to the packaging laminate 20 greater integrity, there is disposed, between the gas barrier 24 and the layer 26 of lamination or sealing agent, a layer 29 of an adhesive by means of which the gas barrier 24 is bonded to the layer 26 of lamination or sealing agent.

[0033] The base layer 21 has been rendered hydrophobic by stock sizing by means of an aqueous dispersion or emulsion of an alkyl ketene dimer in a mixture of alkyl ketene dimers with a varying number of carbon atoms in their respective fat tails, preferably between 16 and 22 carbon atoms. In one particularly preferred embodiment, the base layer 21 has been rendered hydrophobic by stock sizing by means of an aqueous dispersion or emulsion of an alkyl ketene dimer with 18 carbon atoms in its fat tail.

[0034] The quantity of alkyl ketene dimer in the base layer 21 may vary, but is preferably at least approx. 0.25 weight % calculated on the dry weight of the base layer 21. In such cases where the packaging laminate 20 according to the present invention is intended to be employed in connection with foods, the quantity of alkyl ketene dimer should, however, not be greater than approx. 0.4 weight % calculated on the dry weight of the base layer 21. Expressed otherwise, the quantity of alkyl ketene dimer is preferably 2.5-4 kg/tonne of paper or paperboard in the dry base layer 21.

[0035] The outer, liquid-tight coating 23 may be a plastic which is selected from the group essentially comprising polyethylene (PE), propylene (PP) and polyester (PET) or mixtures thereof. Examples of usable polyethylene plastic may be high density polyethylene (HDPE) or linear low density polyethylene (LLDPE), an example of a usable polypropylene plastic may be oriented propylene (OPP), and an example of a usable polyester plastic may be amorphous polyester (APET).

[0036] Preferably, the liquid-tight coating 23 consists of a physical or mechanical mixture of polyethylene (PP) and polyethylene (PE) which, in addition to superior tightness properties against liquid, also possesses sufficient moisture and heat resistance to withstand such extreme moisture and temperature stresses as occur in a normal shelf-life extending heat treatment in a retort. An outer coating 23 of a physical or mechanical mixture of polyethylene (PP) and polyethylene (PE) moreover possesses superior printability at the same time as making possible mechanically strong and liquid-tight seals by so-called-thermo-sealing, when the packaging laminate 20 is reformed into a retortable packaging container.

[0037] In the same manner, the outer, liquid-tight coating 22 may consist of a plastic which is selected from the group essentially comprising polyethylene (PE), propylene (PP), polyester (PET) and copolymers thereof. An example of a usable polyethylene plastic may be a high density polyethylene (HDPE) or a linear low density polyethylene (LLDPE), and an example of a usable polyester plastic may be an amorphous polyester (APET).

[0038] Preferably, the liquid-tight coating 22 consists of a copolymer of propylene and ethylene which is sufficiently moisture and heat resistant to withstand extreme moisture and temperature stresses which occur in a normal shelf-life extending heat treatment in a retort. A coating of a copolymer of propylene and ethylene moreover makes for mechanically strong and liquid-tight seals when the packaging laminate 20 is reformed into a retortable packaging container.

[0039] The layer 24 serving as gas barrier may consist of an organic or an inorganic material. An example of a usable inorganic material may be a metal foil, e.g., an aluminium foil, or a silica oxide coating produced by plasma deposition, and an example of a usable organic material may be a so-called barrier polymer, e.g., a copolymer of ethylene and vinyl alcohol (EVOH).

[0040] Preferably, the gas barrier 24 is an aluminium foil which, in addition to superior tightness properties against gases, in particular oxygen gas, also makes for sealing of the packaging laminate 20 by induction thermosealing which is a simple, but rapid and efficient sealing technique.

[0041] From a packaging laminate according to the present invention, well-functioning retortable packaging containers are produced by fold forming and thermosealing in the previously described manner, packaging containers which may be reliably heat treated at extremely elevated moisture and temperature conditions in a retort, without the packaging laminate delaminating because of moisture and steam which are prevented effectively from penetrating into the base layer, which has been rendered hydrophobic, through exposed incision edges.

What is claimed is:

1. A packaging laminate for a retortable packaging container of the type which is produced by fold forming and sealing of a sheet or web-shaped blank of the packaging laminate, the packaging laminate (10; 20) including a base layer (11; 21) of paper or paperboard and outer, liquid-tight coatings (12, 13, 22, 23) of thermosealable plastic on both sides of the plastic layer (11; 21), characterised in that the paper or paperboard layer is rendered hydrophobic by so-called stock sizing by means of an aqueous suspension or emulsion of an alkyl ketene dimer or mixture of alkyl ketene dimers.

2. The packaging laminate as claimed in claim 1, characterised in that the paper or paperboard layer (11; 21) contains said alkyl ketene dimers in a quantity of at least 0.25 weight %, calculated on the dry weight of the paper or paperboard layer (11; 21).
3. The packaging laminate as claimed in claim 1 or 2, characterised in that the paper or paperboard layer (11; 21) contains between 2.5 and 4 kg of alkyl ketene dimers per 1000 kg of paper or paperboard in the dry paper or paperboard layer (11; 21).

4. The packaging laminate as claimed in any of the preceding claims, characterised in that said alkyl ketene dimers are selected from the group essentially comprising alkyl ketene dimers with 16-22 carbon atoms in their respective fat tails.

5. The packaging laminate as claimed in claim 4, characterised in that said alkyl ketene dimers have 18 carbon atoms in their fat tail.

6. Use of a paper or paperboard layer (11; 21) rendered hydrophobic as base layer in a packaging laminate (10; 20) as claimed in any of the preceding claims.

7. A retortable packaging container of a packaging laminate comprising a core layer (11; 21) of paper or paperboard and outer, liquid-tight coatings (12, 13; 22, 23) of thermosetable plastic on both sides of the base layer (11; 21), characterised in that the paper or paperboard layer (11; 21) is rendered hydrophobic by so-called stock sizing by means of aqueous suspension or emulsion of at least one alkyl ketene dimer.

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