A method of manufacturing a packing laminate and a packing laminate manufactured according to this method.

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A method of manufacturing a packing laminate and a packing laminate manufactured according to this method

The present invention relates to a method of manufacturing a packing laminate, with the purpose of preventing crack formation when the laminate is folded, including cutting through a carrier layer of the laminate, prior to the application of at least one outer layer to the laminate, in an area to be subjected to subsequent folding, so as to avoid rupture of the outer layer of the laminate when folding takes place. The invention also relates to a laminated material manufactured according to the method comprising a carrier layer and at least one homogeneous plastic layer covering the carrier layer as an outer layer. Such method and packing laminate is known (GB A 973 801). The carrier layer thereof comprises slits in order to weaken the material and to enable it to be bent inwardly, and also to protect an inner layer of the laminate against rupture.

During the forming of the packing container, the laminate is subjected to great stresses. This is especially the case on folding of the packing container wall in the actual sealing area consists of three laminate sheets, i.e. has threefold thickness.

To reduce the light transmission of the packing laminate, the laminate often comprises further layers, e.g. a layer of aluminium foil located between the carrier layer and one of the thermoplastic layers which in the finished packing container very effectively protects the packed contents from the effect of light.

During the forming of the packing container the laminated material is subjected to great stresses. This is especially the case on folding of the material, since a folding of the material owing to the relatively great rigidity of the carrier layer means that one of the thermoplastic layers is subjected to a strong stretching, whilst the opposite thermoplastic layer is compressed along the whole folding line. Owing to the great extensibility of the thermoplastic layer, however, this only rarely leads to the thermoplastics being damaged or losing its imperviousness to liquids. The situation is aggravated, however, if the packing laminate also comprises an aluminium foil, which, compared with the thermoplastic layer, possesses low extensibility and consequently tends to crack when the laminate is folded.

Even if normally a single folding about 180° of a packing laminate of the type described may not have any serious consequences with regard to the imperviousness to liquids and the light transmission of the material, great difficulties arise, however, when two such folding lines cross one another. This is often the case along the seal or seals which are always found on the packing containers. The seals are usually realized in that the thermoplastic layer which faces towards the inside of the packing container is heated along the edge regions of the packing laminate which are to be joined together, whereby the two layer areas heated to softening are combined and pressed together so that a sealing fin is produced, which is located on the outside of the packing container and comprises two laminate sheets. The sealing fin, so that it should not form an obstacle, is often folded down against the outside of the packing container, which means that the one laminate sheet experiences a 180° folding and that the packing container wall in the actual sealing area consists of three laminate sheets, i.e. has threefold thickness.

A seal of the aforementioned type often runs along one or more of the side faces of the packing container, and since these side faces, e.g. during the forming of parallelepiped packages from cushionlike packages, are subjected to a folding about 180° along a folding line which runs at an angle of 90° to the seal (described in more details in the following), the material thickness will in certain limited areas of the packing container go up to 6 times the laminate thickness. In this folding about 180° transversely to the sealing region the material sheet which after the folding is located on the outside of the fold (that is to say, the material sheets located outside the neutral plane created) will be subjected to very strong tensile stress with accompanying stretching and crack formation. These tensile stresses are so great that not only any aluminium layer that may have been incorporated in the laminate, but also the thermoplastic layer, cracks with consequent leakages occurring.

It is an object of the present invention to provide a method of manufacturing a packing laminate so that the foldings of the packing laminate described above can be carried out without any risk of crack formation and leakage.

It is a further object of the present invention to provide a method for making possible the folding of several sheets of packing laminate comprising layers of aluminium foil or other little extensible material without any risk of crack formation along the folding lines in the outer sheets.
These and other objects have been achieved in accordance with the invention through giving a method of the type described in the introduction the characteristic that the carrier layer of the laminate is cut around the area where the folding lines converge or cross over one another, whereupon the carrier layer material in the cut-out area is removed.

This method has proved extraordinarily effective in the critical areas where two 180° foldings cross one another. The cut should preferably be circular.

A further preferred embodiment of the method in accordance with the invention has been given moreover the characteristic that the cut is made in the carrier layer of the laminate sheet which after folding and forming of the packing container is located on the outside of the fold.

The invention also relates to a packing laminate manufactured according to the above described method, which in accordance with the invention is given the characteristic that the carrier layer at the places where the packing laminate has converging or crossing folding lines, is removed in the meeting point of the folding lines.

A preferred embodiment of the method and the arrangement in accordance with the invention will now be described in detail with reference to the enclosed schematic drawing figures, which illustrate a known method of sealing and folding the packing container laminate in the manufacture of packing containers and the method in accordance with the invention and how the same is applied to these known types of sealing and folding.

Fig. 1 shows schematically a part of a packing container wall with a sealing fin, which has been folded down to lie against the outside of the packing container laminate.

Fig. 2 shows a portion of a packing container wall which corresponds to the portion shown in fig. 1, which, however, has been folded about 180° (somewhat less for the sake of clarity) along a folding line which extends at a right angle to the longitudinal axis of the sealing fin.

Fig. 3 shows the sealing and folding area according to fig. 2 and illustrates how a part of the material has been removed in accordance with the method according to the invention.

Fig. 4 shows on a larger scale a section in longitudinal direction of the sealing fin in fig. 2.

Fig. 5 shows on enlarged scale a section in longitudinal direction of the sealing fin in fig. 3.

Fig. 6 shows on enlarged scale a section in a longitudinal direction of the sealing fin, a part of the material having been removed in accordance with a further embodiment of the method in accordance with the invention.

The effective in the critical areas where two 180° cut-out area is removed. The material having been removed in accordance with the invention will now be described in detail with reference to the enclosed schematic drawing figures, which illustrate a known method of sealing and folding the packing container wall with a seal of the type material-sheet, which after folding and forming of the packing container is given in the sealing region threefold wall thickness and comprises more particularly an Inner material sheet 3 which constitutes the actual packing material wall in the sealing region, together with two material sheets 4 and 5 forming the sealing fin 2. The material sheet 4 constitutes a part of the material sheet 3 folded over about 180°, and the material sheet 5 constitutes a continuation of the outer one of the two wall portions sealed together in the sealing fin.

The abovementioned type of sealing is customary and occurs in a great number of packing containers of the one-way type. In a known one-way package, which is used e.g. for liquid dairy products and which is made by the conversion of a material web to a tube provided with a longitudinal joint which is filled with the contents and sealed off by means of transverse seals located at equal intervals, this type of sealing is used. These packages, which after filling and sealing obtain an almost cushion-like shape, are then transformed with the help of forming jaws to substantially parallelepipedic shape, whereby inter alia the corners of the cushion are pressed flat and folded in to be sealed against the sides of the packing container. This means that the sides on which the sealing fins are situated are folded about 180° along a folding line which is situated at a right angle to the sealing fin.
This is illustrated in fig. 2, where the sealing fin, just as in fig. 1, is indicated by reference numeral 2, whilst the point at which the two 180° foldings cross one another is indicated by reference numeral 6. At this point thus a folding about 180° takes place of the sealing fin 2 consisting of three laminate sheets, which results in a sixfold material thickness, as can be seen from fig. 4, which shows a longitudinal section through the sealing fin 2 after completion of the folding shown in Fig. 2. The different material sheets are indicated by the same reference numerals as in fig. 1, that is to say 3, 4 and 5.

On folding about 180° of this threefold material the neutral plane, that is to say the plane in which neither tensile nor compression stresses occur, comes to lie substantially between the inside material sheets 4 and 5. In other words, the material sheet 5 situated inside the neutral plane will be pressed together at the place of folding and compressed whilst the two material sheets 3 and 4 situated outside the neutral plane will be subjected to tensile stresses, which are considerably higher in the material sheet 3 which is located outermost. These tensile stresses give rise to crack formation in the carrier layer of the material sheet 3, which, is indicated by reference numeral 7, and frequently also to crack formation in the carrier layer of the material sheet 4 located inside. This crack formation, however, is of minor importance. Owing to the large tensile stresses in the material sheet 3 located outermost, though, crack formation frequently occurs also in the thermoplastic material layer of this laminate or sheet, which has a detrimental effect on the imperviousness of the packing container. When the packing container laminate is of the type which comprises layers of aluminium foil, the double folding of the laminate described unfailingly gives rise to crack formation in the aluminium foil, which crack formation frequently occurs in the two outer material sheets 3 and 4.

To avoid these disadvantages it has been attempted hitherto to increase the elasticity of the materials used to the greatest possible extent, which produced quite good results with regard to the thermoplastic layers, whilst no solution has been found up to now which would prevent crack formation in the aluminium foil.

Some earlier attempts at eliminating crack formation aimed at increasing the capacity of the material to withstand the stresses occurring. This is not the case in the solution according to the invention, which instead endeavours to reduce the stresses, so that, whilst retaining the laminated material which has proved best from other points of view, the necessary foldings about 180° can be carried out without the layers included in the laminate material being damaged, and in accordance with the invention the tensile stresses are reduced in the outer sheets 3 and 4 through bringing them closer to the neutral plane where the stresses are smaller, and more particularly this is done according to the invention in that the carrier layers of the material sheets 3 and 4 (which of course are attached to one another, see fig. 1) are cut out and are also removed in the area where the two foldings about 180° cross one another. The location of this cutout portion of material is shown in fig. 3, where the area in which the two material sheets 3 and 4 lack a carrier layer is indicated by reference numeral 8. As is evident from fig. 5, which corresponds to fig. 4 but shows the folding on a packing laminate modified in accordance with the invention, the thermoplastic layer in the two material sheets 3 and 4, after the removal of the carrier layer in the said material sheets, can now follow in the actual place of the folding a line which in the actual folding almost coincides with the neutral plane, which means that the thermoplastic layers (and also any aluminium layers present) are practically fully relieved of tensile stresses, so that the imperviousness of the packing material and the capacity to exclude light are retained. This limited area 8, wherein the carrier layer of the material has been removed, is located just at the point of intersection between the two 180° foldings, which means that the weakening caused in the material will be wholly unimportant and negligible.

According to a further embodiment of the method in accordance with the invention the tensile stresses on the outer material sheets are reduced instead in that the carrier layer is cut through in the area 8 (fig. 3) in the material sheet 5 which is located inside the neutral plane (fig. 6). Through this measure this material sheet 5, which now only consists of the thermoplastic layers and possibly aluminium foils, will be pressed together more easily and “give way” at the folding, which means that the outer laminate sheets 3, 4 also in this embodiment of the invention, can follow a line which more or less coincides with the neutral plane and quite simply “permits a shorter travel” around the folding line. This method gives the same effect as the embodiment described earlier, but is to be preferred in certain cases, since the measure will be completely invisible on the finished packing container.

The removal of one or more carrier layers from the laminate sheet within the said area takes place already during the manufacture of the laminated material, that is to say before the carrier layer is provided with the two thermoplastic layers and possibly any aluminium layers. The carrier layer is preferably removed by punching out the excess material, so that a hole results which simply and with great accuracy can be placed in the right position, since the creases or folding lines along which the material is to be folded during the forming of the packing container clearly mark the place at which the folding lines will cross one another in the finished packing container.

A packing laminate manufactured in accor-
dance with the method of the invention comprises a carrier layer together with at least one homogeneous plastic layer covering the carrier layer and possibly also further layers e.g. aluminium foil. The packing laminate may be of an arbitrary, known shape, but is provided with perforated portions of the carrier layer at the places where the packing laminate has converging or crossing folding lines. In accordance with the invention the carrier layer at the place where the packing laminate has converging or crossing folding lines is removed at the meeting point of the folding lines.

In accordance with the invention a method and a packing laminate are provided wherein the problems existing up to now in foldings about 180° crossing or converging with one another have been effectively eliminated. The method is simple, inexpensive and allows economies, since the material quality can be lowered and adapted to the appreciably smaller stresses which arise in the remaining part of the surface of the packing container.

Claims

1. A method of manufacturing a packing laminate with the purpose of preventing crack formation, when the laminate is folded, including cutting through a carrier layer of the laminate, prior to the application of at least one outer layer to the laminate, in an area to be subjected to subsequent folding, so as to avoid rupture of the outer layer or layers of the laminate when folding takes place, characterized in that the carrier layer is cut around the area (8) where the folding lines converge or cross one another, whereupon the carrier layer material in the cut-out area is removed.

2. A method as claimed in claim 1, characterized in that the cut is circular.

3. A method as claimed in claims 1 or 2, characterized in that the cut is made in the carrier layer of the laminate sheet which, after folding and forming of the packing container, is located on the outside of the fold.

4. A packing laminate comprising a carrier layer and at least one homogeneous plastic layer covering the carrier layer, the carrier layer at places where the packing laminate has converging or crossing folding lines being provided with perforated portions, characterized in that the carrier layer at the places where the packing laminate has converging or crossing folding lines is removed in the meeting point of the folding lines.

Revendications

1. Procédé pour la fabrication d'un stratifié d'emballage destiné à empêcher la formation de fissures quand le stratifié est plié, comprenant la découpe dans la couche porteuse du stratifié, avant l'application au stratifié d'au moins une couche extérieure dans une zone à soumettre à un pliage ultérieur, de façon à éviter la rupture de la couche ou des couches extérieures du stratifié lors du pliage, caractérisé par le fait que la couche porteuse est découpée autour de la zone (9) où les lignes de pliage convergent où se croisent, après quoi la matière de la couche porteuse dans la zone découpée est enlevée.

2. Procédé selon la revendication 1, caractérisé par le fait que la découpe est circulaire.

3. Procédé selon la revendication 1 ou la revendication 2, caractérisé par le fait que la découpe est faite dans la couche porteuse du feuillet stratifié qui, après pliage et formation de l'enveloppe d'emballage, est placé à l'extérieur du pliage.

4. Stratifié d'emballage comprenant une couche porteuse et au moins une couche plastique homogène couvrant la couche porteuse, cette couche porteuse présentant des perforations à des emplacements où le stratifié d'emballage présente des lignes de pliage qui convergent ou qui se croisent, caractérisé par le fait que la couche porteuse, aux emplacements où le stratifié d'emballage a des lignes de pliage qui convergent ou se croisent, est enlevée au point de rencontre des lignes de pliage.
daß die Trägerschicht an denjenigen Stellen, an denen das Verpackungslaminat konvergierende oder sich kreuzende Faltlinien aufweist, im Treffpunkt der Faltlinien entfernt ist.