

The invention relates to a folding box package made from a liquid-tight, at least internally heat-sealable coated cardboard composite material, more particularly an aluminium laminated cardboard composite, having a flat bottom which is folded on in one piece and is closed by at least one seam, more particularly a web seam applied flat and has two pairs of opposite triangular folding pockets which lie flat and are sealed over their whole area.

Folding box packages of the kind specified are known which have differently constructed bottoms (DE-C-25 20 401; EP-A-0 093 849; EP-B-0 133 863). Those folding boxes are produced from a blank or a roll of web or a jacket, the bottom being heat-sealed by ultrasonics, induction, heat pulse, infrared radiation or hot air. If such folding box packages are intended for the aseptic packaging of materials, normally their inside is furnished over its whole area with a liquid or vaporous sterilizing agent prior to filling. Thereafter the sterilizing medium must be completely removed from the package. To make this possible, in order to prevent the occurrence of voids in the package, the triangular folding pockets must be sealed over their whole area. Such sealing can be more satisfactorily performed by infrared radiation or hot air. Due to the melting point of the heat-sealable coating, which is clearly higher than 100°C, the zones to be sealed to one another must experience hot air at a temperature well above 100°C.

During the activation of the zones to be sealed to one another by hot air it has been found that bubbles form on the heat-activated

inside of the cardboard composite material and cause the risk of leakages. This is more particularly the case with carbon composite material laminated on the inside with aluminium, since in that case the bubbles become warped and more leakages occur in the package bottom during sealing. It was found that bubble formation occurs particularly heavily in the inner areas - i.e., the areas at a distance from the cut edges - and less strongly in the outer areas - i.e., the areas adjoining the cut edges. It was furthermore discovered that the extent of such faults can be kept low if operations are performed at as low an activation temperature as possible. However, a low activation temperature makes it difficult to seal the activated zones over their whole area.

With the object on the one hand of keeping the reject rate during heat sealing as low as possible and on the other hand to still ensure reliable sealing of the activated zones over their whole area, operations can be performed with a relatively high activation temperature, at which the formation of bubbles is just avoided, if the activation temperature can be successfully kept within narrow tolerances. However, the maintenance of such tolerances makes production more expensive.

The invention relates to the problem of providing a folding box package of the kind specified, wherein bubbles do not form on the inside of the cardboard material during the heat-activation of the bottom even if activation is performed at a higher temperature than is absolutely necessary for the heat-sealing.

This problem is solved according to the invention in a folding box package of the kind specified by the feature that the internal heat-sealable coating of the inner areas forming the triangular folding pockets is perforated right into the cardboard. Moreover, however, the outer areas adjoining said inner areas can also be perforated.

The invention is based on the realization that bubble formation can be ascribed to the moisture present in the cardboard composite material which, more particularly with an activation temperature clearly above 100°C, so increases the vapour pressure in the cardboard material that in the case of a dense outer coating, such as is used, for example, with a cardboard coated on the outside to improve the printing of inscriptions or with a cardboard coated on both sides, steam escapes towards the inside of the composite, where it leads to bubble formation and leakages. Such bubble formation affects more particularly the inner areas - i.e., the large-surface areas to be activated, which are not directly bounded by a cut edge, whereas clearly fewer bubbles occur in the areas to be activated which lie directly at a cut edge, while absolutely no bubbles occur in the case of suitably narrow outer areas adjoining the cut edge and extending parallel therewith, since in the case of such outer areas the steam can escape via the open cut edges. According to the invention such a vapour pressure cannot build up at all, since the steam formed during the heat activation of the areas can escape outwards via the perforation, which is at first still exposed. The activation temperature is non-critical - i.e., it

is not vital to maintain the temperature within narrow limits. Tests have shown that bubbles do not form on the inside of the cardboard composite material even if the activation temperature rises by more than 15°C beyond the present-day usual activation temperature of, for example, 160°C. The perforation on the finished package has no adverse effect on its use, since it can be so selected that it is folded in and sealed in, so that it is protected against dirt, nor can any moisture penetrate via the perforation into the composite material.

If required, for example, if the cardboard composite material comprises coated cardboard and/or the inner or outer coating has only a slight adhesion to the cardboard, advantageously the outside of the composite material can also be perforated in the zone of the areas to be sealed in right into the cardboard, to prevent any bubble formation on the outside also.

The invention will now be explained in greater detail with reference to drawings, which show the blank and the bottom of a folding box package with web seam, to represent the various kinds of folding box packages mentioned hereinbefore, to which the invention extends. The hatched areas represent the areas to be heat-activated.

The drawings show:

Fig. 1a a detail of a blank for the bottom, showing hatched the inside inner areas of triangular folding pockets,

Fig. 1b the blank shown in Fig. 1a showing hatched inside outer areas for the web seam,

Fig. 1c the blank shown in Fig. 1a showing hatched outside inner areas in the zone of the triangular folding pockets,

Fig. 1d the blank shown in Fig. 1a showing hatched outside outer areas in the zone of the web seam,

Fig. 1e the blank shown in Fig. 1a showing hatched inner and outer areas which are heat-activated on both the inside and the outside,

Figs. 2a to 2e another blank with an area division as shown in Figs. 1a to 1e prior to the folding of the bottom,

Figs. 3a to 3e a further blank with an area division as shown in Figs. 1, 1c and 1e,

Figs. 4f, 4g, 4h, 4h' and Figs. 5f, 5g, 5h, 5h'

a folding box package from the blank of Figs. 1a to 1e,

Figs. 6f and 6h a folding box package from the blank of Figs. 2a to 2e, and

Figs. 7f, a folding box package from the blank of Figs. 3a to 7g, 7h 3e.

A rectangular blank for a parallelipipedic folding box package shown in Figs. 1a to 1e is made from a cardboard composite material which is laminated on the package inside with an aluminium foil and bears on the inside and outside a heat-sealable plastics coating (PE). Prior to the shaping of the folding box package, the blank is furnished with folding lines 1, as shown in the drawings. On the inside the heat-sealable coating and the aluminium foil are perforated in the inner areas 2 shown hatched in Fig. 1a for the formation of the triangular folding pockets 3, but preferably also in the outer areas 4, shown hatched in Fig. 1b, for the web seam 5. When the outside is densely coated, the composite material is also perforated from the outside in the inner areas 2 shown hatched in Fig. 1c and the outer areas 4 shown hatched in Fig. 1d. Fig. 1e shows the bottom area of blanks with inner and outer areas 2, 4 to be activated on both sides for the bottom sealing.

Figs. 2a to 2e and 3a to 3e show different kinds of other embodiments of blanks for folding box packages having an area division corresponding to Fig. 1.

In Figs. 4 to 7 the bottom zone of the different blanks is shown in the individual production steps. Figs. 4 and 5 correspond to the blank shown in Fig. 1, Fig. 6 to the blank shown in Fig. 2, and Fig. 7 to the blank shown in Fig. 3.

The blank thus prepared is first formed into a tube of rectangular cross-section, as illustrated in Figs. 4f, 5f, 6f and 7f, which show the bottom zone in the activation position. Thereafter the areas of the bottom shown hatched in Figs. 1 to 3 are activated and the bottom is formed by folding in the direction indicated by arrows in Figs. 4f, 5f, 6f and 7f. As a result the triangular folding pockets are formed, as shown in Figs. 4g, 5g and 7g, and the zones of the package bottom shown hatched are folded in and possibly so sealed flat that they are covered in the direction of both the inside and the outside of the package. Fig. 4h shows the finished bottom of a blank as shown in Figs. 1a to 1e, Fig. 4h' shows the finished bottom of a blank according to Figs. 1b or 1d, Figs. 5h and 5h' show the finished bottom of a blank according to Fig. 1b, Fig. 6h shows the finished bottom of a blank according to Figs. 2a to 2e, and Fig. 7h shows the finished bottom of a blank according to Figs. 3a to 3e. In Fig. 5h the triangular folding pockets 3 are shown bent laterally outwards and in Fig. 5h' bent towards the bottom of the package.

Clearly, the kind of blank shown in Figs. 3 and 7 can be used only in the case of a folding box package having a square bottom surface.



CLAIMS

1. A folding box package made from a liquid-tight, at least internally heat-sealable coated cardboard composite material, more particularly an aluminium laminated cardboard composite, having a flat bottom which is folded on in one piece and is closed by at least one seam, more particularly a web seam (5) applied flat and has two pairs of opposite triangular folding pockets (3) which lie flat and are sealed over their whole area, characterized in that the internal heat-sealable coating of the inner areas (2) forming the triangular folding pockets (3) is perforated right into the cardboard.
2. A folding box package according to claim 1, characterized in that the inner and outer heat-sealable coating of the inner areas (2) forming the triangular folding pockets (3) are perforated right into the cardboard.
3. A folding box package according to claims 1 or 2, characterized in that the heat-sealable coating of the outer areas (4) adjoining the inner areas (2) is perforated right into the cardboard.
4. A folding box package according to one of claims 1 to 3, characterized in that the perforation is a needle perforation.
5. A folding box package according to one of claims 1 to 4, characterized in that the perforation is a cut perforation.