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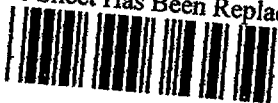
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Sealing cover for an opening of a container

The invention relates to a sealing cover for an opening of a container, with a first foil that seals the opening of the container, with a metal foil, especially aluminium foil, for the inductive sealing of the first foil on the edge of the opening, with a removable sealing lid that can be placed or screwed back on again, with a releasable controlled adhesive layer between the first foil and the metal foil that enables the metal foil to be detached from the first foil after the sealing lid has been removed and with an elastic layer between the sealing lid and the metal foil.

For several decades plastics containers which are sealed with plastics screw closures have been sealed in addition with various inductive sealing discs between closure and container opening. The original purpose of this additional sealing was to prevent the possibility of the liquids escaping during transport or storage. After the unscrewing of the screw closure the end consumer has to destroy the sealing layer additionally or on its own. In the last 10 years this kind of additional sealing has proved effective as a tamper seal, i.e. the end consumer can easily establish after opening the screw closure whether someone has handled the contents between the filler and him, i.e. the filler and marketer has additional protection against attempted blackmail in the distribution system. Many different types of inductive sealing disc have evolved here in the course of time for the various applications and are used in large numbers. The inductive sealing discs or tapes are manufactured separately. The sealing cover manufacturer (method of manufacture predominantly injection moulding) inserts the discs into the cover or punches out of tape material discs which are pressed directly into the covers and bonded. The sealing lid with inserted inductive sealing disc is for example screwed down



after the container has been filled. Thereafter the sealed container passes through an inductive sealing zone. The inductive sealing is effected there. It is standard with all the various composites that part of the composite is a metal foil, in most cases an aluminium foil. The metal foil functions during the induction process as an antenna for the induction current. The energy is converted in the metal foil into heat, which transfers onto a sealing layer and thus brings about the inductive sealing.

Below the metal foil is located the sealing layer tailored to the respective material (plastics material) of the containers. Above the metal foil is located an elastic layer which ensures through the clamping pressure of the sealing lid a satisfactory pressing of the sealing layer against the container. This elastic layer is very often connected to the metal foil by wax or other adhesives. During the inductive sealing process the wax becomes liquid and either diffuses into the specially configured elastic layer or additional paper layers are used. It is characteristic of all inductive sealing layers used to date that after the inductive sealing the metal foil remains firmly connected to the sealing layer on the container.

The problem arises that the aluminium which is used in the inductive sealing, after the opening of the container with destruction of the aluminium layer, remains on the edge of the container opening, and thus prevents recycling of the container.

A method of improving matters is given in US-PS 4 596 338 and EP 0 488 985 A1, under which the metal foil detaches itself from the inductive sealing foil by means of a releasable intermediate layer.



This solution leads to the disadvantage, however, that the aluminium or the metal foil is after the unscrewing or removal of the sealing cap contained in the latter. Although the container can now be disposed of and recycled, the sealing cap nevertheless still presents a problem in disposal terms, namely that mixtures of metal foils with plastics materials (the caps consist in most cases of plastics materials) exclude reclamation or re-use.

It is the object of the invention, on the other hand, to propose a sealing cover which still permits the separate disposal also of these components.

This object is achieved by the fact that there are provided between the metal foil and the elastic layer a separation layer which becomes liquid at induction temperatures and a suction layer, wherein the latter absorbs the liquefied matter of the separation layer during the induction process, and that the controlled adhesive layer does not have such an adjoining suction layer.

With a solution of this kind it is ensured that on the initial unscrewing or removal of the cap (i.e. long after the inductive sealing operation) the metal foil initially still remains sticking or adhering to the inductive sealing foil on the container opening, while the sealing cap can be removed upwards without metal foil parts. Once the sealing cover has been removed, the metal foil can by virtue of the releasable controlled adhesive layer be withdrawn without difficulty from the plastics foil and be used immediately for disposal or recycling of the aluminium. There are then no longer any metal (aluminium) parts on the container opening or in the sealing cap. Thereafter the inductive sealing foil can be destroyed and the contents of the container be removed, and the opening at the same time be sealed again (screwed down) with the



sealing cap after the removal. The elastic layer ensures in this case that the container exhibits a good layered arrangement when sealed again.

The induction sealing packing disc which has been at most two-part to date is preferably changed into a three-part one.

The elastic part, which is desirable for balancing out the tolerances and for the reliable pressing down of the sealing disc, is in particular a polymer disc, in which the choice of the polymer is preferably dictated by the ability to be recycled together with the sealing cap. In addition, care should be taken that the temperature resistance is sufficiently high to prevent "sticking" as a result of the heating up.

The connection to the metal part takes place by means of wax or other adhesive substances, which are applied over the whole area or in a pattern. It is characteristic of these products that they become liquid at high temperatures, in order thereby to be able to diffuse into the paper layer laminated onto the metal foil. The metal foil functions during the induction operation as an antenna for the induction current. The energy is converted into heat in the metal foil. As a result of the heat in conjunction with the selected waxes, adhesives and similar and the chosen paper lamination, a complete separation from the elastic upper part occurs during the induction operation.

The connection of the metal foil to the actual sealing part likewise takes place with waxes or similar. This wax will not diffuse into adjoining layers during the inductance operation, since both the metal foil and the sealing layer cannot absorb any wax. The wax is on the contrary concentrated towards the centre of the disc according to the temperature-time curve, so



that a permanent connection of the metal foil to the sealing part is obtained, which can however easily be broken in a tension-free manner during the removal by hand.

After the removal of the metal (aluminium) foil the plastics layer, which has sealed the container absolutely tight, is opened according to the same method by which the current metal-plastics sealing discs have been opened for decades. A pull-off tab can be fitted to the upper surface of the screw cap for this purpose.

The elastic polymer disc remains in the sealing cap and makes for a perfect seal if the container is subject to multiple use.

An embodiment of the invention will be described in detail below with reference to the drawing.

Fig. 1 shows a diagrammatic section through a container sealing cover in two states and

Fig. 2 a diagrammatic section through an inductive sealing disc.

The figures show sections through a sealing cover. Fig. 1 shows a container 10 which possesses at the upper end an opening 11. The container can be bottle-shaped, but other forms, for example cans, are also conceivable. The left-hand side of Fig. 1 illustrates the sealing cover before, the right-hand side after the unscrewing of a sealing lid 30.

The opening 11 is sealed at the top with a first foil 12. This foil consists of a plastics material as a sealing layer, for example a transparent material, for instance polyethylene, which is tailored to the respective container material. It can



be provided at the top with a reinforcing layer 13, which is clearly distinguishable in the enlarged view in Fig. 2.

The foil 12 is covered at the top with a releasable controlled adhesive layer 15. This releasable controlled adhesive layer is an adhesive material after the manner of an adhesive with a predetermined adhesive power and releasability.

Above the releasable controlled adhesive layer 15 a metal foil 20, for instance of aluminium, is provided. The dimension of the metal foil 20 corresponds after allowance for the conventional tolerances, such as that of the remaining layers of the packing disc, to the size of the opening 11 of the container 10 and to the inner diameter of the sealing lid 30. When inductive sealing is used, this metal foil 20 results in the foil 12 bonding firmly with the edge of the opening 11 of the container 10 and sealing the latter tightly.

The metal foil 20 is held in a downward direction against the foil 12 or the reinforcing layer 13 by the releasable contact adhesive layer 15.

It possesses for its part at the top a suction layer 27 and a separation layer 25.

The two layers 25 and 27 connect the metal foil 20 to the underside of the sealing lid 30. An elastic layer 28 is also provided in the sealing lid 30, which balances out tolerances and provides for a perfect seal of the opening of the container during subsequent opening and closing operations. The sealing lid 30 consists of plastics material, for instance HDPE or LDPE foam, the elastic layer 28 of material which is identical or recyclable together with it in a similar manner.



During the inductive sealing process the releasable controlled adhesive layer 15 and the separation layer 25, which preferably consist of the same material, melt. The material of the separation layer 25 diffuses completely into the suction layer 27, whereas that of the releasable controlled adhesive layer 15 concentrates in the middle of the disc, since the adjoining layers cannot absorb it. It remains connected to the foil 12 or the reinforcing layer 13.

If therefore, during the first opening of the sealing lid 30, upward removal by the consumer takes place, the bonded-in elastic layer 28 is lifted up at the same time, since it is no longer connected to the metal foil 20. All the other components remain on the opening 11 of the container 10. The sealing cover 30 can therefore be removed upward without non-recyclable parts of the composite remaining adhering or bonded in it.

Now, however, the composite can be separated with exertion of a slight force by manual lifting of the metal foil 20 away from the sealing layer, since the releasable controlled adhesive layer 15 has undergone a concentration in the centre of the disc in accordance with the temperature-time curve.

The consumer then has the first foil 12 (optionally with reinforcing layer 13) right before him and now only has to destroy the latter to get at the contents of the container.



Claims

1. Sealing cover for an opening of a container, with a first foil (12) that seals the opening (11) of the container (10), with a metallic foil (20), especially aluminium foil, for the inductive sealing of the first foil (12) on the edge of the opening (11), with a removable sealing lid (30) that can be placed or screwed back on again, with a releasable controlled adhesive layer (15) between the first foil (12) and the metal foil (20) that enables the metal foil (20) to be detached from the first foil (12) after the sealing lid (30) has been removed and with an elastic layer (28) between the sealing lid (30) and the metal foil (20),
characterised in that
there are provided between the metal foil (20) and the elastic layer (28) a separation layer (25) which becomes liquid at induction temperatures and a suction layer (27), wherein the latter absorbs the liquefied matter of the separation layer (25) during the induction process, and that the controlled adhesive layer (15) does not have such an adjoining suction layer.
2. Sealing cover according to claim 1,
characterised in that
the elastic layer (28) between the sealing lid (30) and the separation layer (25) or the suction layer (27) is an elastic polymer layer.
3. Sealing cover according to claim 2,
characterised in that
the elastic layer (28) consists of a material that can be recycled together with the sealing lid material.





4. Sealing cover according to any one of the preceding claims,
characterised in that
there is used for manufacturing the sealing cover an inductive sealing disc consisting of a composite material comprising a polymer disc (28), a separation layer (25), a suction layer (27), a metal foil (20), a releasable controlled adhesive layer (15) and a foil (12) for the sealing in this order.
5. Sealing cover according to any one of the preceding claims,
characterised in that
the releasable controlled adhesive layer (15) and the separation layer (25) consist of the same material, in particular a wax.
6. Inductive sealing disc for a sealing cover according to any one of the preceding claims,
characterised in that it consists of a composite material comprising a polymer disc (28), a separation layer (25), a suction layer (27), a metal foil (20), a releasable controlled adhesive layer (15) and a foil (12) for the sealing in this order.

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