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ALUMINIUM FOIL PROTECTS MEDICINES PERFECTLY

Just as aluminium foil is indispensable where the packaging of foodstuffs is concerned, so too is it indispensable for the packaging of pharmaceutical products like tablets, ointments, drops or powders. Here aluminium foil's superior mechanical and physical properties – above all its outstanding barrier properties where air and oxygen, light, humidity and/or water vapour, and micro-organisms are concerned – also make it an important packaging material for pharma products.

It offers perfect protection particularly for highly sensitive products like pharmaceutical products and contributes to their long shelf life. Looking at this from a different angle, aluminium's barrier properties also contribute to preventing the loss of the valuable constituents of the pharmaceutical products. As a constituent of packaging materials, aluminium foil can be processed into the most varied range of packaging: to blister and strip packs, laminate tubes, flat pouches, sachets, heat-seal membranes and closures.

The triumphant success of the blister pack

Aluminium foil is now of paramount importance for blister packs for individually packaged tablets and capsules – either as a mono-material or as a laminate with other packaging materials like plastic and/or paper.

In order to produce a blister one needs an easily formable plastic like PVC or a copolymer to shape the blister cavities or

recesses that accommodate the medication. In addition, it is necessary to have a hard aluminium foil that is very rigid for the backing material of push-through packs, which also has to exhibit good adhesion for coating the foil.

The introduction of blister packs led to large material savings compared with bottles and containers. In addition, blister packs can be stored in a space-saving manner, including at the pharmacy.

Besides plastic/paper/aluminium composites there are also blister packs made only of aluminium foil, so-called cold form blisters, which also go under the name Formpack. These aluminium/aluminium blisters are perfect for highly sensitive products that require full protection against moisture and gases. The aluminium/aluminium blister offers the ultimate protection for medication, especially in regions with extremely high humidity. More advanced Formpack blisters are now on the market that allow a material saving of more than 30 per cent by volume and also offer improved protection against humidity.

New aluminium/aluminium blisters made from aluminium foil of different thicknesses (45 and 25 µm) are now also available and these no longer require perforation between the individual blister cavities, which means the diffusion of moisture can be prevented more effectively. Other Formpack blisters have a desiccant in the sealing layer of the cold-formed blister bottom foil. It allows the storage life to be extended to several years even under tropical conditions.

Blister packs are generally very effective in providing protection against damage, product tampering, contamination and incorrect dosage. Consumers can always see how many tablets they have taken. In addition, the appropriate dosage instructions or other information can be printed on the aluminium foil.

The foil: unrivalled partner in laminates for pharma packs

Manufacturers are continually striving to improve the packaging of pharmaceutical products – and not just blister packs – to achieve greater product and consumer protection, more convenience and to conserve resources.

The laminate tube with its wafer-thin aluminium barrier layer provides optimal product protection and allows precise dosage and hygienic application of the contents. Furthermore, the aluminium seal membrane over the tube aperture offers evidence of tampering before a pack is used for the first time.

Strip packs are mostly produced in combination with paper or plastic. Easy opening is of particular importance with this form of packaging. The aluminium foil's good formability and excellent dead-fold properties allow the packaging material to be adapted precisely to the shape of the tablet. Strip packs can be packed at very high machine speeds on sterile filling machines.

Laminated sachets or pouches offer packaging solutions for numerous products such as powders, creams or liquids. Sachets are robust and ensure that the product stays intact for longer periods of time thanks to the aluminium foil. They can withstand extreme pressure, are lightweight and can be transported economically. Large-format aluminium pouches are often used in hospitals for storing, transporting and administering sterile (liquid) pharmaceuticals.

Manufacturers are also continually developing new practical solutions for opening and closing packs using aluminium foil. Single-dose stick packs with a notch or laser-perforation for quick and easy opening are now available for administering liquids and powders.

The three-layer aluminium foil laminate is another example of an innovative closure system: It is sealed to the glass container and when the screw-top closure is rotated it is automatically removed without having to peel away the foil membrane separately.

Tamper evidence – ever more important

Tamper evidence is particularly important for pharma products in order to better recognise the integrity of a packaging or even counterfeits. Here use is made of fluorescent inks that are only visible under UV light, iridescently reflecting features, holograms, microprint, guilloches and halftone printing like that used for securities.

Recently it has also become possible to use micro-holographic embossing, which is applied directly to the aluminium foil or the packaging material. The embossing can contain an image, brand or other graphic symbol that uniquely identifies the manufacturer. This differs from the process hitherto used in which a holographic PET film is applied to the aluminium foil. In this case surface wear is possible so that the holographic surface can be completely rubbed away. The new process produces thousands of tiny impressions directly onto the aluminium foil surface to create images in accordance with the client's design. The image is then reflected when illuminated by a normal light source.

Resource-conserving packaging

Aluminium foil also demonstrates its full capabilities where environmental aspects are concerned. Foil is recycled either to recover the metal or – as in the case of very thin foil (e.g. in composite packaging) – its energy. With waste that is collected separately (e.g. the Green Dot scheme), modern separation systems filter out the foil from the packaging waste and recover it correctly sorted. As a partner in a composite laminate with other packaging materials, the aluminium can be recovered as a metal using pyrolysis techniques. In those cases where aluminium foil or foil packaging is not collected separately for recycling but is mixed together with the rest of the household waste, the energy stored in the foil is recovered.

New studies have shown that a considerable fraction of even the thinnest foil does not oxidise during energetic recycling but melts; it can be sorted from the ash of the incineration plant and returned to the material loop. Nowadays, material loops have been closed to a large extent in the packaging sector as well. The overall recycling rates for aluminium packaging are now about 89 per cent in Germany and some 60 per cent in Europe.