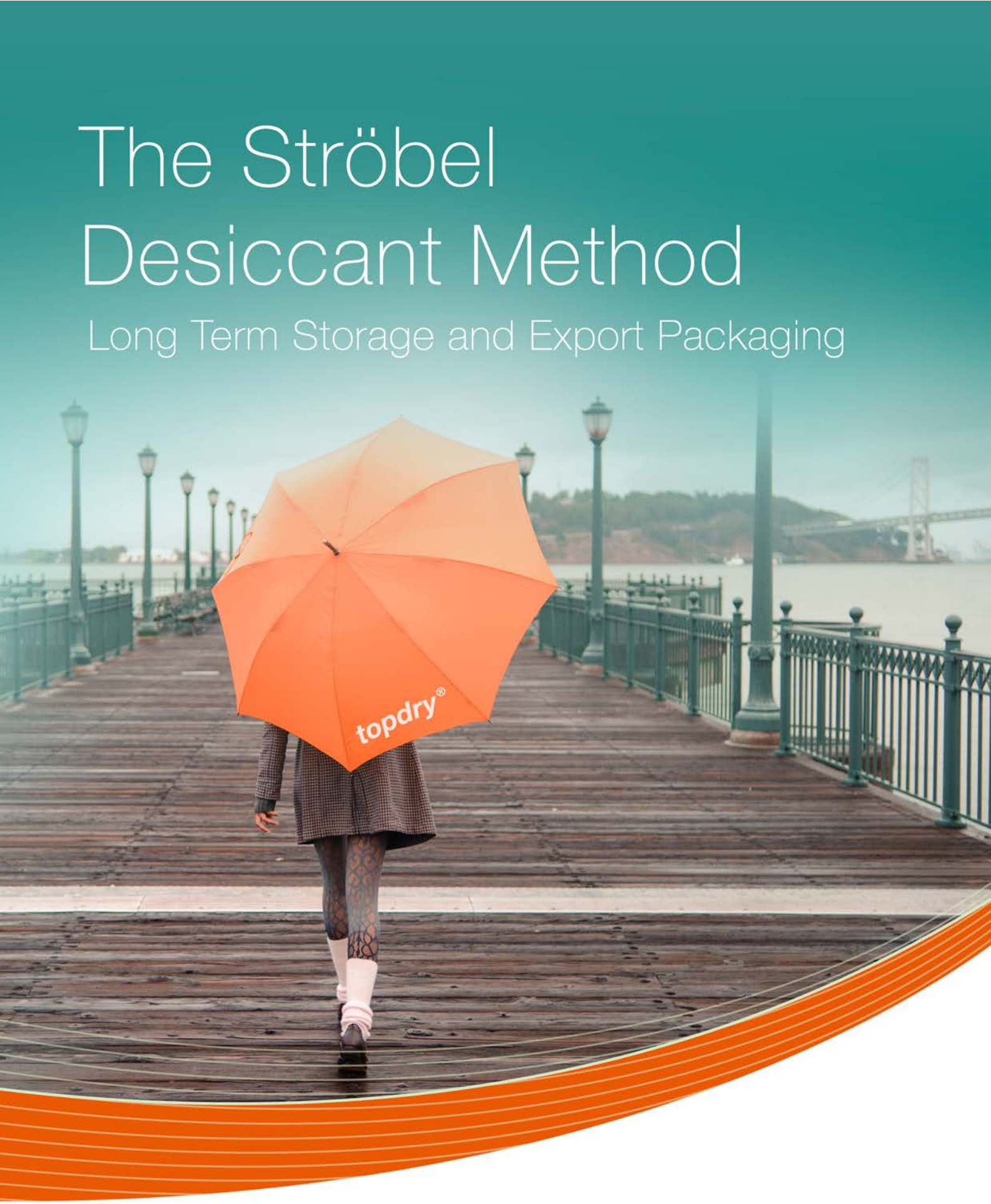
The Ströbel Desiccant Method

Long Term Storage and Export Packaging



Your partner for
customized packaging

Ströbel

The desiccant method

Introduction

Your products deserve packaging that protects them against dirt and dust as well as against all environmental factors such as high humidity, rain water or saltwater that can cause corrosion during air, sea or marine shipping.

The desiccant method described here provides excellent protection for all types of packaged products and prevents corrosion and mould growth during the shipping and storage process. The best way to protect your products against corrosion and to conserve them over lengthy periods is to use desiccants in conjunction with packaging whose atmosphere is sealed off from the ambient environment by a moisture-resistant barrier layer shell. Desiccant bags reduce humidity inside the packaging and obviate the need for post-unloading preservative removal.

Our desiccant method is based on two important components: a barrier layer shell & desiccants.

Component n. 1: polyethylene or aluminum composite films can be used as a barrier layer shell. The packaged goods are hermetically sealed in the barrier film. Both types of film are almost completely water-vapor-tight:

- Polyethylene films (200µ) are used for storage periods of up to approx. 12 months (mainly for transports within Europe).
- Aluminum composite films are mainly used for periods of more than 12 months (export, overseas and long-term storage packaging).

Component n. 2: The desiccant adsorbs the humidity (water vapor) inside the packaging. According to **DIN 55473** desiccant clay (bentonite) can adsorb around 6 grams per 1 DU (desiccant unit) at 40 percent relative humidity.

Durable corrosion protection

If properly packaged in aluminum composite film, desiccants protect the packaged goods

- ✓ for up to 10 years.

It is of utmost importance that the packaging remains completely watertight and water vapor resistant throughout the transit and storage phase. It should be noted in this regard that if the packaging is opened by customs officials or the like and is not resealed properly, the packaging loses its protective effect.

An amazing fact …

Research shows that damages caused by improper anti-corrosion measures each year amount to around 3 percent of Europe's gross domestic product.

Typical applications

Export and overseas packaging, and **long-term storage packaging for A**utomotive parts, axles, CNC milling machines, cylinder blocks, electrical enclosures, injection moulded parts, kitchenware, machines, measuring instruments, metal parts, printers, screws, swing door components, tools **to Z**inc-plated parts…

How the desiccant method works

The use of desiccants in conjunction with barrier layer films provides for a **dry** and **artificial microclimate** inside the packaging, with relative humidity amounting to less than 40 percent, which by experience does not allow for condensation and corrosion to occur.

Ströbel topdry® desiccant bags are free of contact corrosives and water soluble adsorption agents and use bentonite, which is a natural product, as a water vapour adsorbing medium. These bags are endowed with dust-proof properties by virtue of being made of paper, fiber fleece, or Tyvek.

The bags' adsorption capacity **reduces humidity** in the **moisture-resistant packaging**; and this in turn completely eliminates the risk of corrosion during transit or storage. Inasmuch as the water adsorption capacity of the desiccant is limited, it can only be used for products that are enclosed in a moisture-resistant barrier layer shell such as topdry aluminum composite film or 200µ LD-PE film.

Shell, which prevents adsorption of humidity from outside, e.g. through film or container wall openings

Desiccant, which adsorbs humidity between shell und packaged goods

Auxiliary packaging material (e.g. pallet or cardboard sheet, if

Corrosion can be caused by:

- ✓ **Air:** humidity; oxygen; industrial emissions; sulfur dioxide, nitrogen oxide.
- ✓ **Water:** seawater, chlorinated drinking water and the like.
- ✓ **Acids:** Caustic materials; mordants; grease and solder removal agents; free acids in box lumber; galvanic baths near packaging departments; and other acidic elements.
- ✓ **Dust:** Dust and dirt attract dampness and bind corrosive substances. Hardened oil and grease bind dampness.
- ✓ **Perspiration from hands,** which contains chlorides, sulfates, phosphates, as well as lactic acid, uric acid and fatty acid.

Disposal

Both the desiccant bags and the aluminum composite film can be disposed of as normal waste.

Benefits of the desiccant method

- ✓ Can be used for any material.
- ✓ No chemicals are released.
- ✓ Legal certainty (DIN standard).
- ✓ **Quick and easy application**
  No need to degrease the application surface using solvent; surfaces can be treated immediately.
- ✓ **Easy to dispose of and environmentally friendly**
  Recyclable; thermally recyclable.

Desiccant calculation

You need the following information in order to calculate DUs (desiccant units):

- Water vapor transmission rate (WVTR) of the relevant barrier layer
- Dimensions and surface area (in square meters) of the film/foil being used
- Transit and storage time

Calculation equation

$$\text{DU count} = \frac{\text{MVTR x square meters x transit/storage time}}{\text{6 g of water vapour adsorption per DU}}$$

To ensure legal certainty, the **calculation** can also be based on the more complex formula pursuant to **DIN 55 474,** which takes into account the following factors:

- Ambient temperature and humidity during the packaging process, because these factors strongly influence the amount of water vapor that ends up inside the packaging of your product
- Permitted humidity inside the barrier layer in relation to the amount of water that can be adsorbed per desiccant unit
- Barrier layer volume and
- Barrier layer surface
- The amount of hygroscopic products packed together with your product
- Water vapor transmission rate (WVTR) of the relevant barrier layer film
- Transit and storage time

DIN Geprüft

✓ TESTED by BSFV
according to DIN 55473 standard
Consulting, Research, System Planning, Packaging Development and Packaging Testing Institute

The result of this calculation is the required number of desiccant units.
We would be happy to help you determine your desiccant needs – Please do not hesitate to get in touch!

Handling

Important notes

- ✓ Once products are clean and dry, package them as soon as possible.
- ✓ Always wear gloves when packaging the parts, which should be clean and free of fingerprints prior to packaging.
- ✓ The length of the protection period is strongly affected by whether additional packaging is used, as well as by ambient conditions during the shipping and warehousing phases.
- ✓ The protective atmosphere normally forms inside the packaging within around 24 hours, depending on the ambient temperature.
- ✓ The packaged products can be used right out of the package. No degreasing required.
- ✓ Metallic elements should be packaged in an airtight room that displays low humidity and a stable ambient temperature. The surface temperature of the metallic elements being packaged should be equal to or greater than the ambient temperature, since otherwise condensation will form on the metal surfaces and will end up in the packaging. Gas, dirt and galvanic vapor should not be allowed to exert any effect on the packaging process or the elements being packaged.

Usage tips

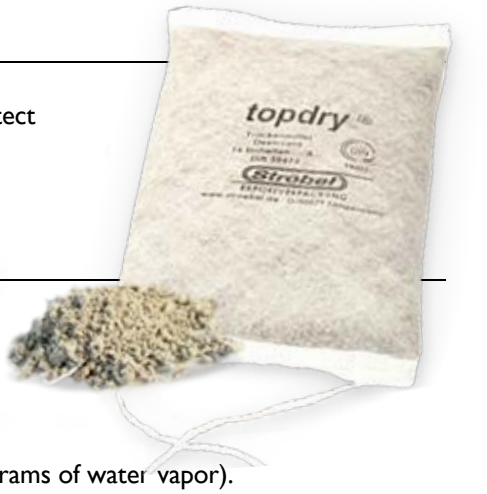
- ✓ To avoid condensation, place the desiccant bag in the upper third of the moisture-resistant packaging.
- ✓ Design moisture-resistant packaging and the cover thereof in a manner that avoids water pockets on the surface of the packaging.
- ✓ Make sure that the packaging seams are watertight.
- ✓ Seal the moisture-resistant packaging immediately after placing the desiccant bags in it.
- ✓ Never remove existing protective layers.
- ✓ Desiccants should be replaced after 24 months, as they lose their effectiveness if used longer than this.
- ✓ Cushion sharp edges and corners on goods when packing them.
- ✓ Check the water-tightness of foil/film packaging.
- ✓ Only suction out around 70 percent of the air in the packaging so as to allow for sufficient air circulation in it.
- ✓ The moisture of hygroscopic products packed in moisture-resistant packaging should be kept to a minimum.
- ✓ Do not allow desiccant bags to come into contact with metal surfaces.
- ✓ **However**, the bags must still be placed **inside** the packing unit, and not outside the box or the like.
- ✓ Only use DIN 55473 conformant desiccants.

How to store desiccants and barrier films

Keep them in a cool, dry place that is not exposed to direct sunlight. Do not store the products outside, at high humidity or at temperatures exceeding 25°C. In case of doubt concerning the use of desiccants and barrier films, feel free to contact us. We'll be more than happy to analyze your packaging process and provide you with advice on site.

Ströbel topdry® desiccant bags

Product information



Ströbel topdry® desiccants provide optimal shipping and storage conditions and protect goods that are susceptible to moisture. The product prevents corrosion and mould by adsorbing and reducing the humidity in the packaging.

Product materials and attributes

Ströbel topdry® desiccant bags, which meet the DIN 55473 requirements, have a dust-proof shell that is filled with a natural product known as bentonite. Bentonite adsorbs around 6 grams of water vapor per desiccant unit at 40% relative humidity.

Desiccants are sold in so called desiccant units (1 desiccant unit (DU) can adsorb 6 grams of water vapor).

Usage

The storage and shipping time have to be considered when calculating the amount of desiccant required; and of course it's essential for the products to have an effective aluminum composite or PE film barrier layer; for without this barrier layer, desiccant has virtually no effect because the moisture in the packaging cannot be perpetually adsorbed.

Desiccant bag placement:

- ✓ To prevent condensation from forming in export packaging, the desiccant bags should be placed in the upper portion of the packaging.
- ✓ To maximize the protection period, seal the moisture barrier packaging immediately after the desiccant bag is placed in the packaging.
- ✓ In so doing, make sure that only about 70 percent of the air in the moisture-resistant packaging is suctioned out of it (using an industrial vacuum cleaner), so as to preserve air circulation in the packaging and thus enable the desiccant bags to function properly.

Product shelf life

Approx. one year if stored in its original packaging in a cool and dry place.

Our desiccant calculator will help you calculate how much desiccant your application requires.
Just scan the QR code or go to: www.stroebel.de/en/bag-configuration-tool.html

Barrier material: aluminum composite film

Product information

Countless environmental factors such as temperature, moisture, dust and the like can adversely affect product quality. This almost invariably provokes customer complaints that can cost you a great deal of time and effort. The best way to ward off such problems is to use exactly the right packaging.

Aluminum composite film can be used to protect a host of different products ranging **from A**uto accessories, axles, chip cards, coffee, cylinder blocks, electrical enclosures, hops, injection moulded parts, kitchenware, machines, measuring instruments, metal parts, PCBs, pharmaceutical products, pianos, powders, printers, screws, spices, swing door components, tools, **to Z**inc-plated parts. Various types of aluminum film products are used, depending on the application.

Product attributes

- ✓ Meets DIN 55531-1 and TL 8135-003-1 requirements
- ✓ Water vapor resistant
- ✓ Moisture repellent
- ✓ Seals in aromas
- ✓ Sterilizable
- ✓ Robust and versatile

Applications

Aluminum compsosite films are typically used as barrier layers for long-term storage and export packaging. The robust aluminum compsosite film bags and coverings provide your products with optimal protection against moisture, ultraviolet light, dirt and mechanical factors. The topdry aluminum composite film creates a layer that safeguards the packaged goods against the external environment. The desiccant keeps the air in the packaging dry. As no chemical substance is released inside the packaging, this method can be used for just about any type of material.

Product composition

AL-VS FILM

PETP		12 µ
Coupling agent		
Aluminum		12 µ
Coupling agent		
HDPE, white	75 µ	
Material thickness ~103 µ		

AL-PE FILM

PETP		12 µ
Coupling agent		
Aluminum		12 µ
Coupling agent		
LDPE, transparent	75 µ	
Material thickness µ		**~103**

How to store aluminum composite films

Keep them in a cool, dry place that is not exposed to direct sunlight.

Aluminum composite film products

Product range

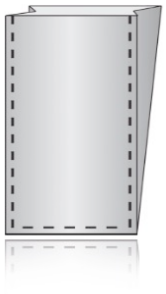
Depending on the size of your product, you can choose from our stock options:

The following stock options are available for individual products, small parts and spare parts:

- ✓ Flat bags
- ✓ Flat bags with zipper

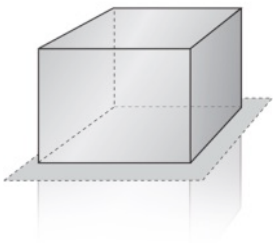
For plants and machines, we recommend the following products:

Side gusset bags



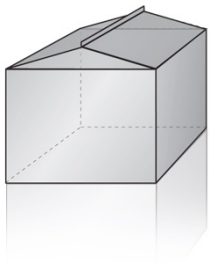
- ✓ Can be used as box inserts
- ✓ For bulk items
- ✓ Large filling volume
- ✓ Also available as perforated bags on a roll

Box covers with bottom sheet



- ✓ Ideal for heavy and bulky goods
- ✓ Easy to handle: just cover your goods and seal the edges of your tailored packaging product

Box inserts



- ✓ Ideal for filling and loading operations
- ✓ Easy to seal thanks to horizontal seam (stretch closure)

Barrier material: LD-PE film (200 µ)

Product information

Countless environmental factors such as temperature, moisture, dust and the like can adversely affect product quality. This almost invariably provokes customer complaints that can cost you a great deal of time and effort. The best way to ward off such problems is to use exactly the right packaging.

LD-PE film can be used to protect a host of different products ranging **from A**uto accessories, axles, chip cards, coffee, cylinder blocks, electrical enclosures, hops, injection moulded parts, kitchenware, machines, measuring instruments, metal parts, PCBs, pharmaceutical products, pianos, powders, printers, screws, spices, swing door components, tools, **to Z**inc-plated parts. Various types of aluminum film products are used, depending on the application.

Product attributes

- ✓ Meets TL 8135-0019 requirements
- ✓ Meets DIN 55530 requirements
- ✓ Extremely versatile
- ✓ Very easy to convert

Applications

LDPE films are suitable for countless uses. When combined with desiccants, they provide optimal protection against moisture and corrosion for both shipping and storage. When used with our topdry® desiccants, Ströbel LDPE film coverings provide optimal protection for shipments over short distances within Germany or Europe. For sea transport packagings or export packagings for shipments to Shanghai, New York or Sao Paulo we recommend our aluminum composite films.
LDPE films are suitable for a broad range of purposes, including the following:

- ✓ As a protective barrier
- ✓ As a barrier against moisture
- ✓ Packaging film
- ✓ Covering film

Important notes

Beware of discount prices...
LDPE films are in great demand owing to their versatility. As a result, various vendors now sell films at budget prices. Such vendors tend to sell 200 micron films that are in fact only 180 or 190 microns thick. And of course the prices of these films are lower. But when you buy such films, you may not be getting what you ordered. When you buy our films, however, we always provide the exact thickness specified; although we cannot match of course the budget prices of other vendors that in fact short-change you by providing films that are thinner than they're supposed to be.

When it comes to LDPE packaging film, you can count on us for quality!
When you buy LDPE packaging films from us, you get exactly what you ordered. Our 100 and 200 micron LDPE films meet TL 8135-0019 requirements. They are tested in accordance with TL guidelines and thus meet TL and DIN 55530 requirements, which call for maximum strength tolerance of plus or minus 5 percent.

Barrier material: LD-PE film (200 µ)

Product range

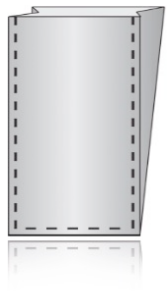
Depending on the size of your product, you can choose from our stock options:

The following stock options are available for individual products, small parts and spare parts:

- ✓ Flat bags
- ✓ Perforated bags on rolls

For plants and machines, we recommend the following products:

Side gusset bags



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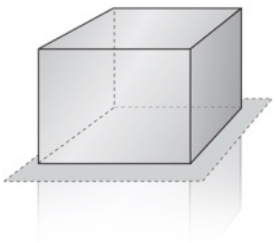
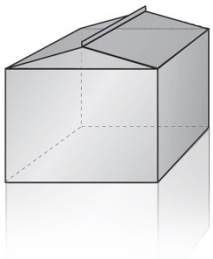


- ✓ Ideal for heavy and bulky goods
- ✓ Easy to handle: just cover your goods and seal the edges of your tailored packaging product

Box inserts



- ✓ Ideal for filling and loading operations
- ✓ Easy to seal thanks to horizontal seam (stretch closure)

Accessories

Foamed PE film

Because of its closed-cell structure foamed LDPE film provides optimal protection for the surface of your packaged goods. Foamed PE film is dust free, moisture repellent, and easy to fasten, stamp, cut or seal. It can also be laminated with LDPE or HDPE films, or can be provided as pink antistatic film.

- ✓ Extremely lightweight
- ✓ Fills empty spaces
- ✓ Protects against dust and moisture
- ✓ Recyclable

Bubble wrap

Bubble wrap is indispensible when it comes to packaging products with sensitive surfaces. Our bubble wrap is available with different thicknesses, both as 2-ply and 3-ply film.

- ✓ Ideal cushioning protection
- ✓ Flexible and elastic
- ✓ Easy to use
- ✓ Versatile

Heat sealing tongs

Heat sealing tongs allow for optimal heat sealing of materials such as aluminum composite film, coated paper, and lacquered cellophane. Both sealing time and temperature are determined by the quality of the sealing material. The sealing tong jaws are continuously heated and the sealing temperature can be adjusted steplessly using the device's temperature regulator.
The tongs are available with 300 or 400 mm wide jaws, and have lengthwise fins. The jaws can also be coated with Teflon, if desired.

- ✓ High quality sealing
- ✓ Easy to use
- ✓ Sealing time can be set individually
- ✓ Can be used for all types of sealable material
- ✓ Ready to use in a jiffy

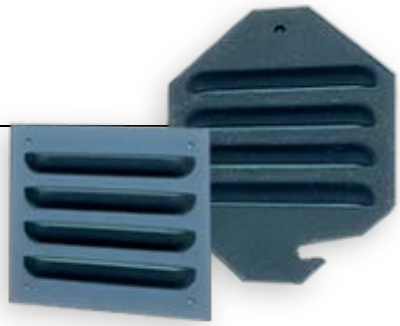
Humidity indicators

Humidity indicator cards (HICs), which are mainly used for long-term storage and export packaging, indicate relative humidity (RH) inside a given barrier packaging. The indicator cards are impregnated with moisture sensitive spots that respond to various levels of humidity with a visible color change. The humidity indicator spots are reversible, and will change back to the original color when the humidity decreases.

- ✓ Cobalt-dichloride free
- ✓ Monitor humidity
- ✓ Easy to use
- ✓ Reach compatible
- ✓ In accordance with JEDEC standard

Important notes: Humidity indicator cards can only provide a snapshot view of the shipping process and are NOT suitable for seamless monitoring of the shipping process. For more accurate measurement we recommend our data loggers. Please do not hesitate to send us a request for more information about our shipping monitoring solutions.

Louvered vents



Moisture can easily accumulate between the exterior walls of large shipping crates and the barrier layer shell. Louvered vents or hinged steel covers ensure the air circulation inside the wooden crates in order to prevent mould growth.
Hinged covers also allow for checking humidity indicators from the outside.

Depending on the size of the packaging, we recommend you to place two or more louvered vents in the upper part of the packaging.

Rubber seals

Rubber seals for PE and aluminum composite film coverings prevent humidity from entering into the packaging.

Service

Customer service

Feel free to contact us to discuss your packaging needs over the phone or on site.

There's no getting around the fact that the commercial success of your products is largely dependent on their being impeccably packaged. Packaging preserves the product's value, optimizes packing times, storage costs, and shipping costs, and provides a firewall against complaints.

We will be more than happy to work with you to find the optimal packaging solution for your products.

Our packaging engineers will be there for you every step along the way:

- We will first work with you to obtain a general picture of your current situation
- We will then elaborate a solution, in collaboration with you
- The ideal packaging for your products will then be produced

Feel free to call us to set up a meeting to discuss your packaging needs.

Tools and services available from our website

Covering configuration tool

Products should always be shipped with a protective covering. This tool allows you to carry out calculations for customized aluminum composite film coverings, including the optimal amount of Topdry™ desiccant, for optimal protection of your products.

Use our quick and easy covering calculation tool, which is available at:

https://stroebel.de/en/covering-configuration-tool.html

Desiccant calculator

Our custom made barrier packaging solutions provide optimal protection for your products only when used with our Topdry® desiccants.

The desiccant calculator below will help you estimate how much desiccant your application requires.

Begin calculating now at:

https://stroebel.de/en/desiccant-calculator.html

Notes

Learn more at
www.stroebel.de

Notes

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