

DRY PRODUCT PROTECTION



Benefits

- Provides outer packaging cleanliness and allows for standard disposal
- Avoids odour transfer in and out of the package
- Reduces the need for expensive modified atmosphere warehousing
- No limitations on the size or shape of our packaging formats
- Hot-fill up to 150°C and retortable
- Food contact approved aluminium barrier foil box liner
- Preserves your products original characteristics
- Packaging formats to support every stage of your product development
- Residual moisture and oxygen levels are maintained within the desired levels
- Hygroscopic resins are fully protected

Differentiators

- Replicated manufacturing facilities in the UK and USA
- 24hr turnaround focusing on quality and on-time delivery
- No minimum order quantities
- No limitation on size, shape or style
- ISO 9001:2015 certification
- ISO 14001:2015 certification
- Laminates are manufactured in BRCGS accredited facilities
- 600+ years of collective experience within the industry
- Experienced in serving all sizes of business from owner-operated enterprises to multi-national corporations
- A Carbon Neutral certified business
- On-site laboratory for the testing of laminate and product performance
- In-house R&D capabilities including bespoke laminate structure development

Prolonging Product Life



Established in Manchester in 1988, the company has grown to become a worldwide leading designer and manufacturer of climatic packaging solutions.

Protective Packaging's expertise is in the design, manufacture and supply of barrier foil packaging for all industries. Specialising in dried product protection and corrosion prevention, we manufacture a range of Aluminium Barrier Foil, 2D and 3D Bags and Liners, to suit any application where deterioration of the packaged product may take place.

Ensuring the appropriate packaging of dry products is paramount in protecting them from atmospheric changes that may lead to the degradation of their integrity, contamination or deterioration. Employing moisture barrier bags and liners in conjunction with the existing packaging solution is a highly effective means of achieving such protection.

Our expert team can create bespoke barrier bags to fit corrugated boxes, octabins, F.I.B.C. liners and drums. Our comprehensive range of moisture barrier bags includes 25kg sacks, 20' and 40' ISO container liners, flat bags, pouches, and continuous tubing, providing our clients with a wide range of formats to choose from.



Protection Against

- Moisture Vapour Ingress
- Oxygen Ingress
- UV Light
- Extreme Temperatures
- Odour Transfer
(in and out of the package)
- Mould and Fungi Growth
- Grease and Oils
- Chemicals

Typical Applications

- Adhesives and Sealants
- Chemicals
- Chilled Food
- Engineered Plastics
- Food Preservation
- Medical Devices
& Diagnostic Kits
- Pharmaceuticals
- Polymers and Compounds





Manufacturing Facilities

Protective Packaging's expertise is in the design, manufacture and supply of a range of barrier foil packaging for all industries.

Our in-house manufacturing facilities consist of hand fabrication and automated manufacture, as well as on-site laboratory testing.

All of our key products are manufactured to ISO 9001:2015 standards in ISO 14001:2015 certified facilities.

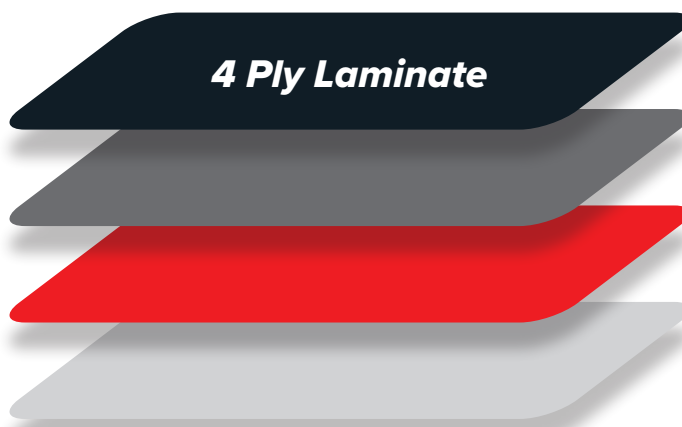
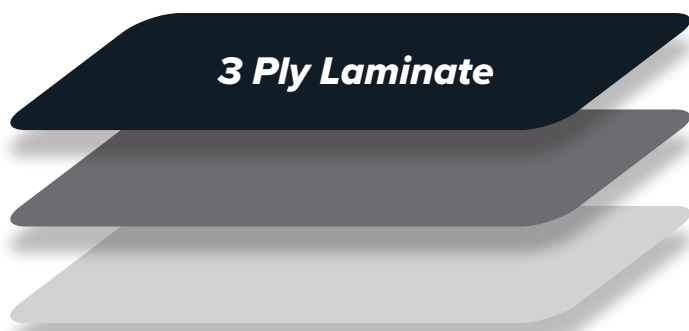
- Material creation and bespoke laminate structures to suit individual requirements.
- Smart features such as tear notching, zipper pouches, valves and windows or clear panels.
- On-site laboratory for the testing of laminate and product performance.
- On-site engineering team, repair service for heat sealers available.

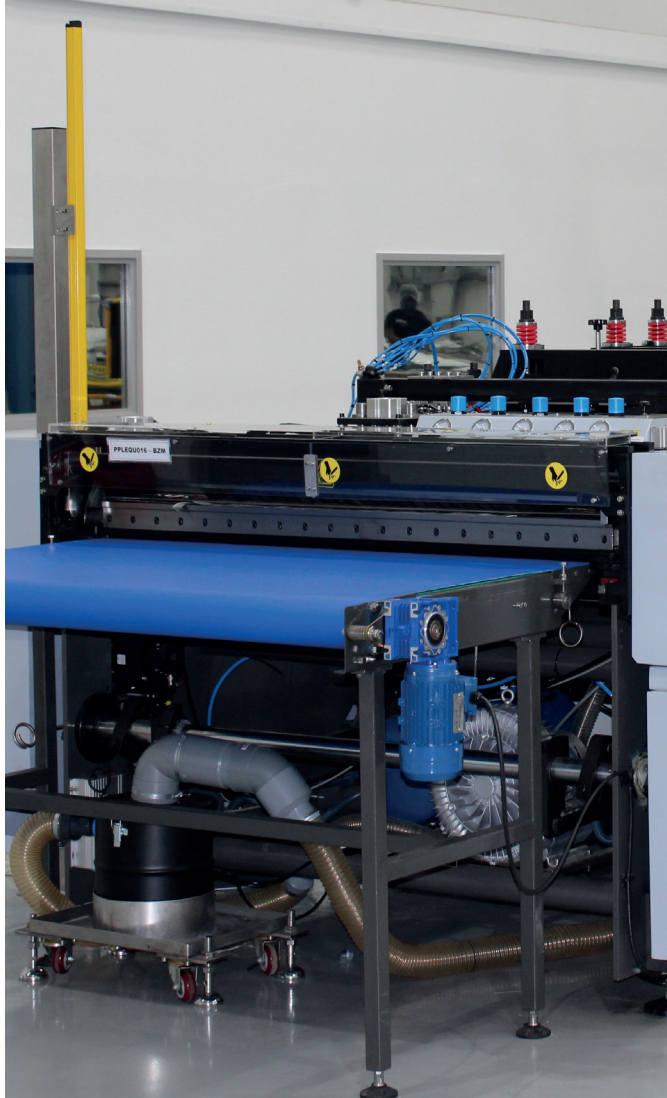


Aluminium Barrier Foil - A Typical Construction

Aluminium barrier foils are constructed of different polymers, including a layer of aluminium, that are bonded through a lamination process, to create a flexible barrier material. We provide a range of specifications but typically our laminates are comprised of 2 (duplex), 3 (triplex) or 4 (quadplex) layers of materials, bonded together with adhesive or extruded polyethylene to create a strong construction.

The generic construction of materials includes layers of Polyester, Aluminium and Polyethylene, but this is dependent on application and customer requirements.





Ultimate Barrier Properties

An indication of the performance of aluminium barrier foils is provided by their Water Vapour Transmission Rate (W.V.T.R.), which at $<0.01 \text{ gm/m}^2/24\text{hr}$ for the virgin laminate itself and less than $<0.05 \text{ gm/m}^2/24\text{hr}$ for converted laminate, is lower than any known flexible packaging material.

By comparison, polyethylene, with for example a thickness of $125\mu\text{m}$, allows water vapour to diffuse at a rate of up to $4 \text{ gms/m}^2/24\text{hr}$ (80 times faster).

Oxygen transmission rate, (OTR) is the steady state rate at which oxygen can permeate through a material. The OTR of aluminium barrier foil is $< 0.001 \text{ cc/M}^2/24\text{hrs}$ for virgin laminates and $< 0.006 \text{ cc/M}^2/24\text{hrs}$ for converted laminates, which is lower than any known flexible packaging material.

Within the heat sealed Aluminium Barrier Foil Bag, a calculated amount of desiccant can be added to ensure the relative humidity (RH) remains well below 38% - the starting point for corrosion.

Polyester

Each layer serves a vital purpose - the outer layer is usually polyester which resists high temperature, has good mechanical strength, waterproofs the material and protects the aluminium layer.

Aluminium

The buried layer of aluminium, acts as a barrier to prevent water vapour, oxygen and aggressive gasses from entering the pack. This is the key to the Aluminium Barrier Foil's performance in preventing deterioration of products.

The Barrier layer also performs the same protection in reverse - retaining odours/flavours inside the sealed bag, which is important in food packaging.

Polyethylene

Finally, a layer of polyethylene allows the barrier foil to be heat sealed into a range of shaped bags and liners.

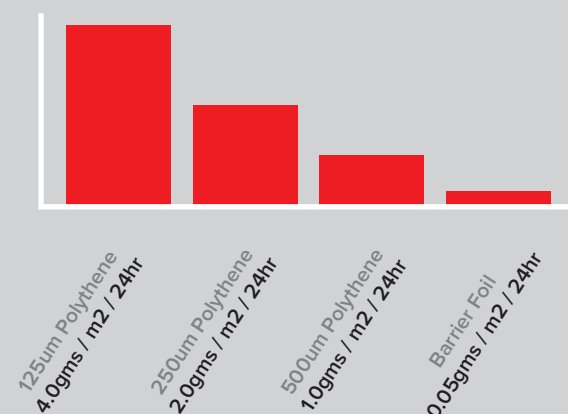
There are many possible variations to the laminate construction to satisfy our customer's technical and commercial requirements.

Nylon

A layer of Nylon can be added to enhance both the gas barrier and puncture resistance.

Polypropylene

Polypropylene when used as a cast material has a particularly high melting point. When included in the construction of a laminate, this enables the foil to be exposed to temperatures above $120^\circ \text{ Celsius}$ for sterilisation or boiling.



Products & Solutions



Flat Bags & Pouches

When it comes to the packaging of products where the process or dimensions dictate that the most appropriate format is a flat bag or pouch rather than a 3-D bag, our 3-side sealed bags and pouches are available in any size.

For multiple-use applications, we also provide re-sealable zippered packaging solutions.

The barrier foil laminates that Protective Packaging offer are approved to the relevant food standards, are suitable for sterilisation by gamma irradiation and ensure your products retain their original characteristics. We also have static dissipative laminates available, which safeguard from static discharge.

Our wide range of flat bags and pouches are ideal for both corrosion prevention and dried product protection applications across a myriad of industries.



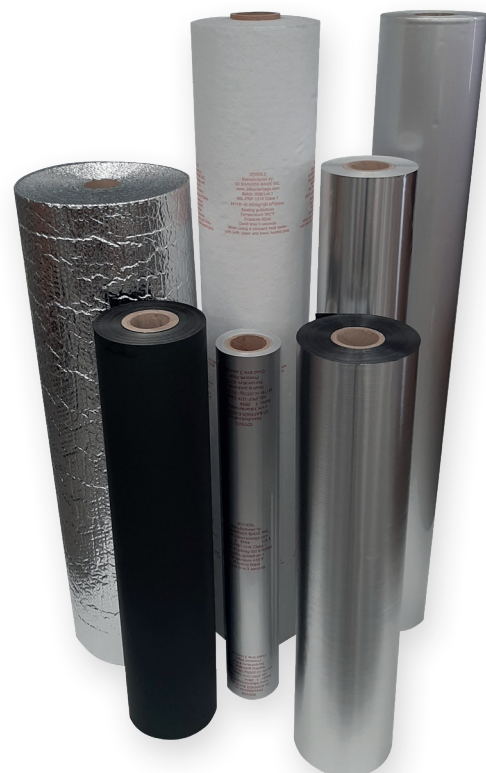
Laminate Grade Options

Multiple aluminium and polymer combinations to provide different characteristics of strength and application performance, including;

- FDA and European Pharmacopoeia approved
- Military approved (MIL-PRF-131L Class 1, DEF STAN 81-147, NF H 00310, DIN 55 531)
- NATO Green
- Static dissipative
- Hot-fill
- Retortable
- Metallised duplexes
- Transparent high-barrier duplex

Re-sealable Zipper Pouches

- Easy and convenient way to open and close the pouch, making it simple to access the product inside. Improving the overall user experience and customer satisfaction
- Ensure retention of your products original characteristics
- Protects the product from environmental factors
- Extends shelf life during use
- Tamper-evident



Octabin Liners

Our octabin liners are predominantly used for the shipment and storage of hygroscopic dried product formulations such as powders, granules and flakes. Our octabin liners safeguard your product and ensure retention of its original characteristics.

Manufactured in different laminate grades to suit your application and sized to suit the internal dimensions of your octabin, our liners are available configured as open top or with top and/or bottom spouts in order to facilitate safe filling and discharge. Our octabin liners provide total protection against moisture vapour and oxygen ingress and prevent odour transfer.

Our octabin and F.I.B.C. liners are suitable for all hygroscopic and oxygen-sensitive dried products across a myriad of industries.

F.I.B.C. Liners

Bulk bag liners are used for the shipment and storage of hygroscopic dried product formulations such as powders, granules and flakes.

Our liners for bulk bags are designed to be fully integrated into the F.I.B.C.

Manufactured in different laminate grades to suit the application, our liners are available configured as open top or with top and/or bottom spouts in order to facilitate safe filling and discharge. Our bulk bag liners provide total protection against moisture vapour and oxygen ingress.



- Designed to be fully integrated in the F.I.B.C./Octabin
- Available in different laminate grades to suit the application
- Total protection against moisture vapour, odour transfer and oxygen ingress
- Suitable for all hygroscopic and oxygen-sensitive dried products
- Available with top and bottom filling spouts

Barrier Foil Liners for Drums & Pails



Drum Liners

Our elegantly designed round-bottom drum liners are available to suit all standard international pails and drums in both generic and bespoke fitting formats. These include different diameter sizes as well as straight or tapered-shaped designs. All our liners are designed to be compatible with end-of-line gas flushing processes.

Drum and pail liners are specifically designed for the bulk shipment of dried formulations and high-viscosity fluids.

A dedicated range of barrier foil laminates, specifically developed for adhesives and sealants and in particular reactive hot melts (RHMs) are available. These include laminates suitable for hot fill applications up to 150°C as well as specially formulated silicone coated laminates. Industry-specific surface energy characteristics are achieved so that these laminates strip readily away from solidified adhesives and sealants.

Common Industries

- Adhesives and sealants
- Agriculture
- Automotive and aerospace
- Chemical manufacturing
- Construction and building materials
- Cosmetics
- Food processing and packaging
- Paints and coatings
- Pharmaceuticals



Drum and pail liners are specifically designed for the bulk shipment of dried formulations and high viscosity fluids.

- Wide range of **diameter** and **height** options
- Laminates that are suitable for **hot-fill** applications
- **Military grade** laminates are available
- **Anti-static** laminates are available
- Barrier foil drum and pail liners act as a flexible steel can, allowing metal drums to be **downgraded to fibreboard or corrugate**

Aluminium Barrier Foil Tubing



Available in single wound pleat and gusseted formats. Suitable for the manual packaging of products and form-fill-seal applications.

Aluminium Barrier Foil Rolls. Our single wound sheeting is available ex-stock in widths of 1M, 1.25M and 1.5M. Our in-house slitting and rewinding capabilities enable us to supply an extensive range of bespoke widths and lengths.

Continuous Non-standard Width Sheeting is available on rolls in a variety of widths and lengths to suit your application and handling requirements.

Lay Flat Tubing is perfect for packing items with the same width but different lengths. It is a continuous roll bag allowing you to cut to the desired length and package your item.

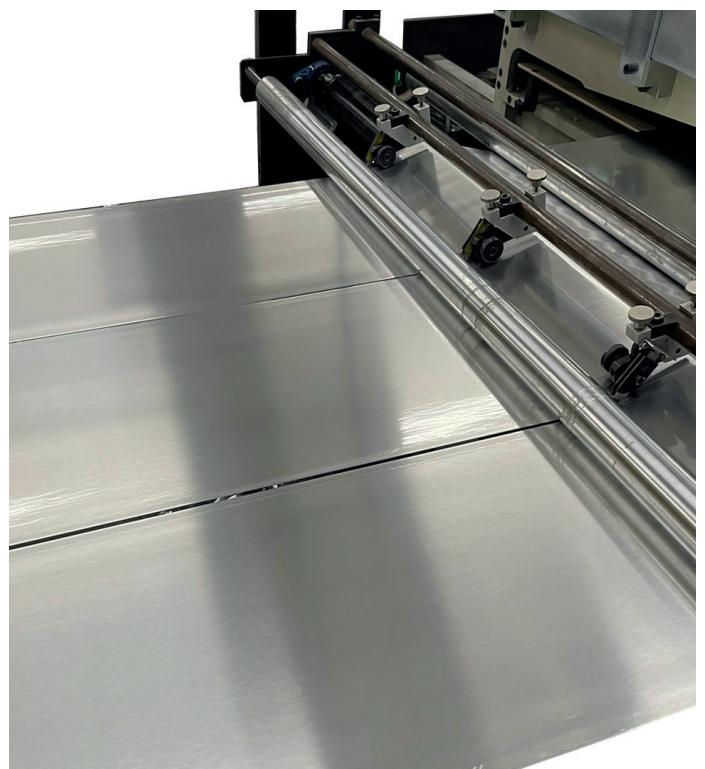
Gusseted Tubing has a pleat on each side that allows it to accommodate large or bulky items. The expanding capabilities of the design allow different sized items to be packaged within the same roll of material.

We can also format our barrier foil materials into lay flat sheets or blankets as well as supply our barrier foil in various roll sizes.

Form, Fill, Seal (FFS). All the above formats are available for use with all vertical and horizontal FFS machines for better-quality packaging.

Bespoke Individual Sheets available with no limitation on size.

- ✓ **MIL-PRF-131L Class 1 laminates available**
- ✓ **Original property characteristics are maintained within tolerance**
- ✓ **Allows you to tailor-make bags to any size**
- ✓ **FDA approved laminates**



25kg Sacks with Degassing Valve

Aluminium Barrier Foil Valve Filling Sacks

Protective Packaging's 25kg sack with degassing valve ensures that the original characteristics of your products are properly maintained during transport and/or storage.

Our 25kg sack with degassing valve has superior tear and puncture resistance due to the added layer of polyamide. We have also adapted our valve sack to have an external anti-slip layer of polyester, providing enhanced stacking and palletisation stability.

The sack design provides the perfect solution for protecting dried formulations such as powders, granules or flakes. After the sack has been hermetically sealed, the one-way degassing valve allows any trapped air to escape preventing the build-up of gases and equalising the internal pressure.



The one-way degassing valve allows air extraction, pressure equalisation and better palletisation.



Container Protection Products

Aluminium Barrier Foil Container Liner

Our bespoke ISO container liners manufactured from aluminium barrier foil are the perfect solution for protecting the integrity of your products throughout the storage and transit processes.

Our range of container liners are tailor-made to fit the inner dimensions of 20', 30' and 40' containers, allowing a cost-effective means of shipping atmospherically sensitive products where a polyethylene liner is not suitable.

In line with your product, whether it be a bulk dried solid, individually palletised dried product or corrosion sensitive machinery and equipment, our hand fabricated container liners are based on your specific application meaning that we can tailor the liner to suit your exact requirements, with particular reference to the processes of loading and unloading.

Aluminium barrier foils have the lowest transmission rates of any known flexible material, maintaining the residual moisture and oxygen to the desired levels. Thermally-protecting liners are also available for temperature-sensitive products.



We can manufacture the bulkhead and filling / discharging / venting features to suit individual specifications.

ProDriPole Desiccant Pole

ProDriPole® is a unique desiccant system developed specifically to protect the contents of ISO 20' and 40' containers from the detrimental effects of humidity and the phenomenon known as container rain. It is fully REACH and CLP compliant.

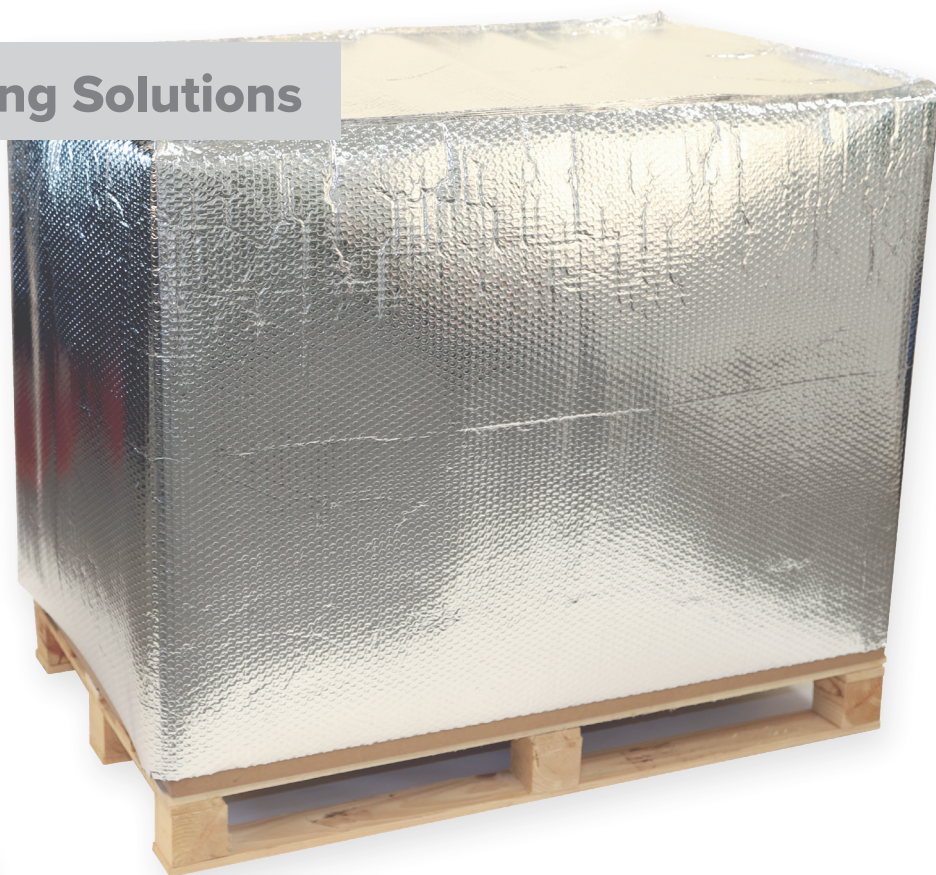
Using anhydrous Calcium Chloride as the desiccant, ProDriPole® is designed to work in relatively open environments as opposed to silica gel, which must be contained within a controlled atmosphere such as a foil bag in order to be effective.

The unique design of ProDriPole® allows the absorptive qualities of the anhydrous Calcium Chloride to be maximised.

Generally, 4-6 poles are required for 20' containers and 6-12 poles for 40' containers. The number varies according to the length of transit, prevailing conditions and type of cargo.



Thermal Packaging Solutions



Thermally insulating covers, bags and liners

Maintain your product's temperature within the required range during transport and/or storage with our thermal box liners and pallet shrouds.

Our 2 and 3-dimensional thermal box liners and pallet shrouds are designed and manufactured to fit the dimensions of single corrugated cartons or entire pallets of goods.

Thermal box liners

- **Increased Storage Time:** when kept at an ambient temperature with ice gel packs, products can be stored for up to 36 hours
- **Cost-effective:** compared to other packaging solutions
- **Durable:** re-usable/multi-use Box Liners
- **Optimum Warehousing:** 1 pallet of liners equates up to 7 pallets of competitor industry packaging reducing required storage space
- **Tear Resistant:** our Barrier Foils are extremely tear and puncture resistant
- **Laminate Range:** different materials are available to support your thermal box liner requirements

Thermal box liners and pallet shrouds increase the efficacy of cool packs ensuring chilled food goods are maintained at a suitable temperature while outside of refrigeration. Our range of barrier foil laminates are approved to FDA standards and are suitable for food contact.

- Manufactured from our extensive range of laminates including our PPUVI29 laminate, a combination of a layer of reflective metallised polyester film and thermally insulating bubble polyethylene
- Suitable for the protection of all product formulation types across a range of products including pharmaceuticals, foodstuffs and speciality chemicals
- Can be considered as a substitute to polystyrene in reducing the sublimation rate of dry ice
- Compatible for use with all ice and gel coolant packs

Bespoke packaging formats including pallet hoods, carton in-liners, bags and pouches to suit individual requirements to provide protection against extremes of temperature.

Heat Sealing Equipment

Protective Packaging offer a range of heat sealing equipment which can be used to achieve effective seals on both Aluminium Barrier Foil and thermoplastics. The sealers are offered in a range of different formats suitable for a broad spectrum of operations, from the small user right up to large-scale manufacturing operations. Sealers can be purchased or offered under a rental agreement.

HZ Handheld Sealer

The sealer provides accurate temperature control, plus a ribbed jaw surface for easy identification of seal integrity. This hand sealer is compatible with all grades of Barrier Foil. It has a sealing width of 12mm and is available in jaw lengths of 20, 30, 40 and 50cm.

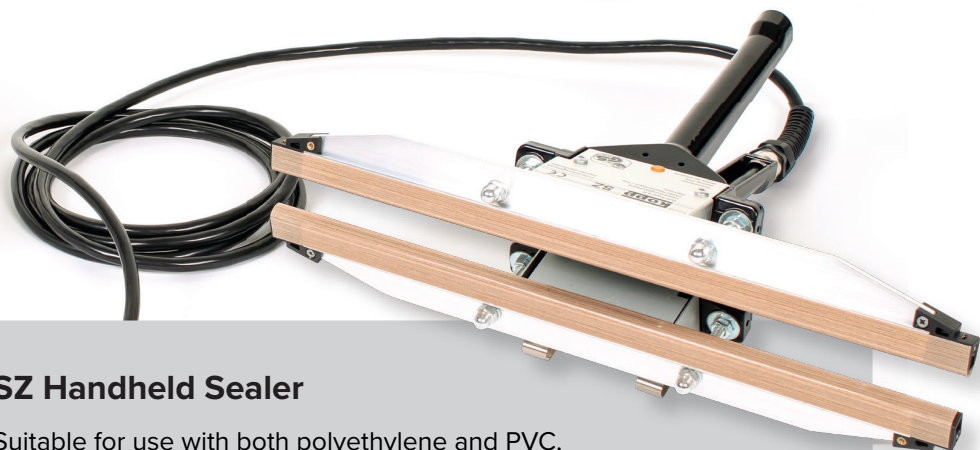
- Ergonomic and lightweight design
- One-man operation
- Minimal heat transfer to handles
- Easy to see 12mm ridged seal
- Easily adjustable temperature gauge to accommodate the requirements of the material being sealed



We also provide a maintenance and repair service.

SZ Handheld Sealer

Suitable for use with both polyethylene and PVC, this hand held impulse sealer has a highly accurate timer. It has a sealing width of 3mm and the jaws are available in lengths of 20, 30, 40, 50 and 60cms.



Desiccant & Indicators



Up to 80 times reduction in desiccant when used with a barrier foil versus polyethylene 125µ



Desiccant

A desiccant is a product that has a very high affinity to the adsorption of moisture vapour. Our desiccant bags can provide you with measurable pack performance when used in conjunction with our barrier foil packaging.

Desiccant is required to remove any **residual water vapour** inside the aluminium barrier foil bag and to neutralise the small amounts of water vapour, which will subsequently pass into the bag from the atmosphere. We use the **BS1133 Section 19** desiccant calculation to work out how much desiccant you require for your application and via our in-house manufacturing team, have the capability to integrate the desiccant into the barrier bag.

Our range of desiccant packs are appropriate for both commercial and military applications together with food and pharmaceutical.

Available in a variety of sizes ranging from 1/2g sachets to 1KG bag.

Desiccant types include activated clay, silica gel and molecular sieves.

Humidity Indicators

A humidity indicator is a device used to measure and display the relative humidity (RH) level in the surrounding environment. Intended for assisting in monitoring the air's moisture content, which holds crucial importance for specific products and materials. The device typically consists of a small, colour changing card or strip that is sensitive to changes in humidity levels.

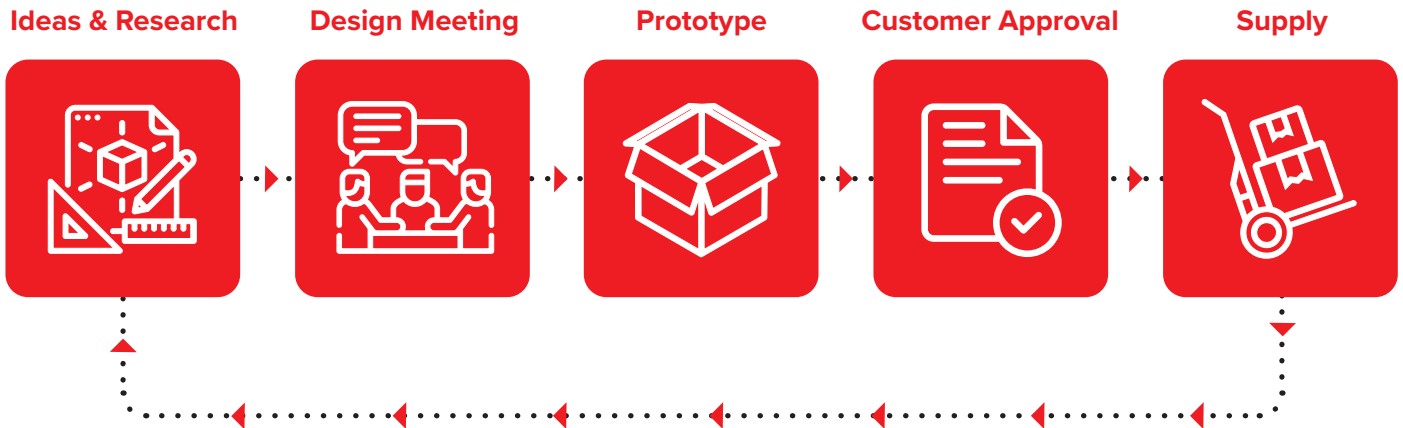
Humidity indicators help to ensure that products are stored in **optimal conditions**, which can help to maintain their **quality** and **prolong their shelf life**. This is particularly important for products that are sensitive to moisture, such as electronics, pharmaceuticals, and certain types of food.

An **affordable** method for monitoring RH levels, ensuring that products are stored under suitable conditions.



Humidity indicators are used to monitor the internal humidity.

Research & Development Process



Management Systems & Accreditations

We believe that quality is crucial to the success of our business, which is why we are proud to be certified to ISO 9001:2015. Protective Packaging was accredited to BS5750 (predecessor to ISO 9001) in November 1991 and have been continuously quality accredited since then.

ISO 9001:2015 is a globally recognised standard for quality management systems that helps organisations to consistently meet the needs and expectations of their customers and other stakeholders. Our ISO 9001:2015 certification demonstrates our commitment to quality and our willingness to go above and beyond to meet the needs of our customers. It also allows us to continually improve our processes and systems to ensure that we are providing the highest level of quality possible.

By implementing a rigorous quality management system, we are able to monitor our processes and identify any areas for improvement. This allows us to make changes to our processes, systems, and products to ensure that we are meeting the needs of our customers and delivering the highest level of quality possible.

ISO 9001:2015 also helps us to ensure that our employees are well trained and capable of performing their roles to the best of their abilities.

By providing ongoing training and development opportunities, we are able to continually improve the skills and knowledge of our staff, which in turn helps us to provide better products and services to our customers.

We are also an ISO14001:2015 Environmental Management System accredited business. The environment has always been a topic close to our hearts at Protective Packaging; we have been working towards our goal of 14001 certification following our carbon neutral status. This is a further step in our efforts of reducing our environmental impact and striving for a more sustainable future. We prioritise any advancements that contribute to the well-being of the environment and aid in the planet's recovery. Being acknowledged for our efforts in this direction brings us great joy and motivation.

The element of continual improvement that is integral to the ISO 14001 requirements will be used to help our business to move from smaller, specific improvements towards greater enhancements in our organisational processes. Through these systematic processes, we can achieve the added benefits of 14001 in assisting our employees to find new and improved ways to reduce our environmental impact and save time and resources as we improve our processes.



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