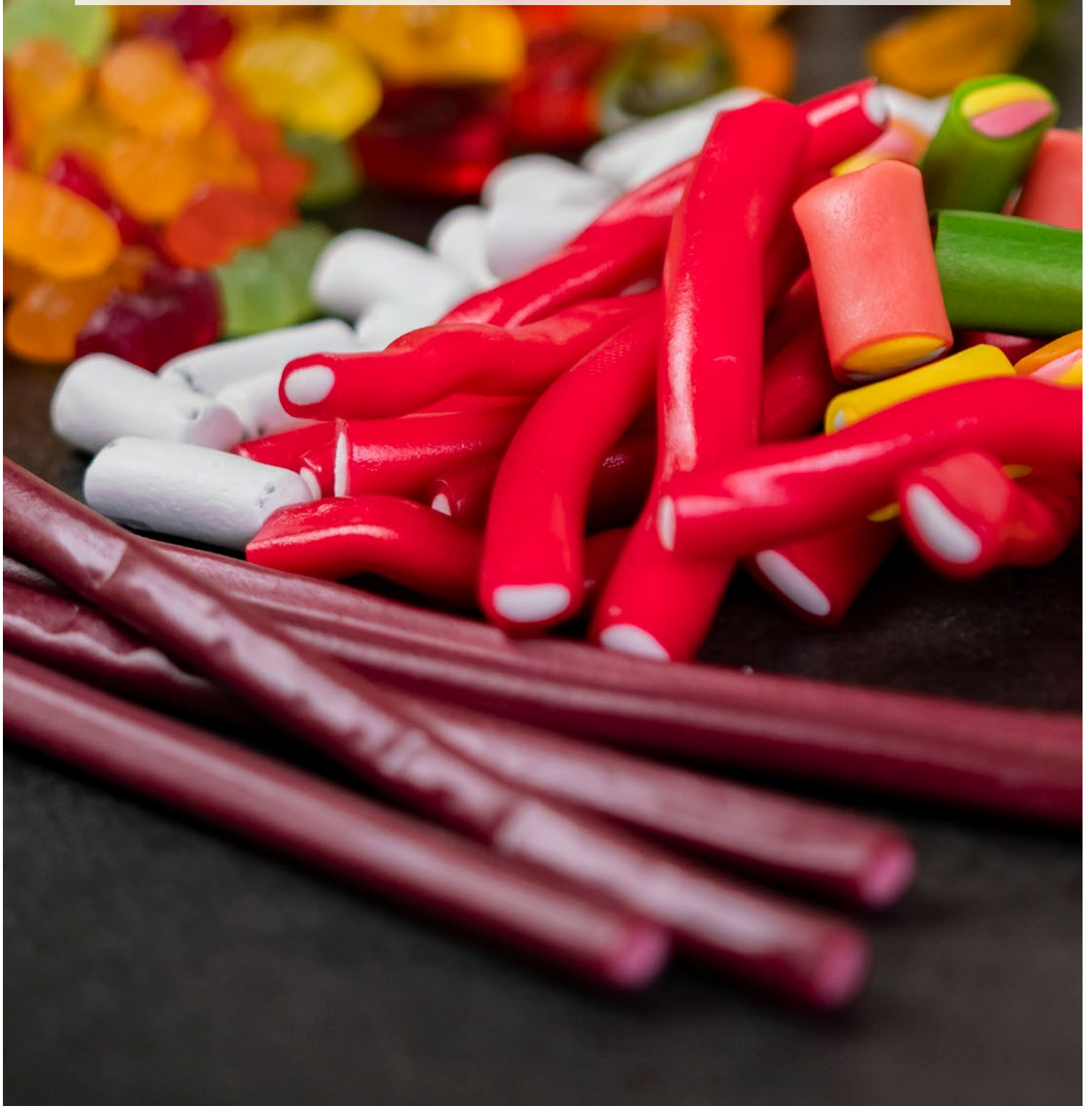
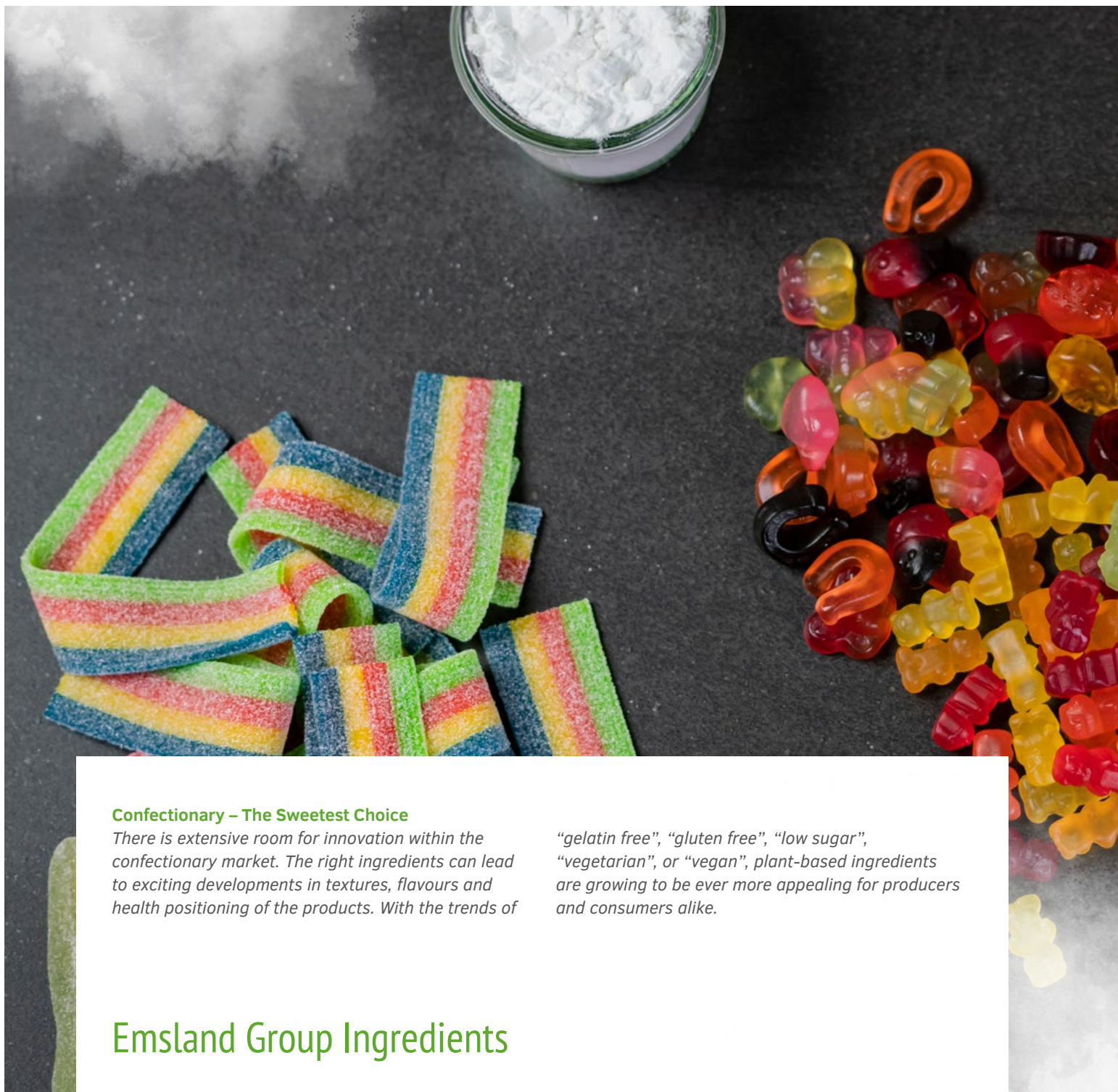


EMSLAND GROUP[®]
using nature to create

Confectionary





Confectionary – The Sweetest Choice

There is extensive room for innovation within the confectionary market. The right ingredients can lead to exciting developments in textures, flavours and health positioning of the products. With the trends of

“gelatin free”, “gluten free”, “low sugar”, “vegetarian”, or “vegan”, plant-based ingredients are growing to be ever more appealing for producers and consumers alike.

Emsland Group Ingredients

The Emsland Group's solution for confectionary are pea- and potato-based ingredients to aid in functionalities, such as texturizing and gelling. Whether your goal is to develop gums and jellies

free from unattractive ingredients, or to reduce costs by replacing expensive ingredients, our experts apply their extensive knowledge to develop a quality solution compatible with your production process.





Jellies & Gums

Gelatin Replacement & Plant Based

The use of starches in jellies and gums is well known in the industry. The first generation of gelling starches were used to replace some of the gelatin that is traditionally used in these applications and the aim was usually to cut costs. **Emox® C 70 S** and **Emes® KSA 1502** are first generation gelling starches used to replace part of the gelatin. In general, **Emox® C 70 S** is used in higher dosage than **Emes® KSA 1502** and leads to more firm products. **Emes® KOA 3005** is a gelling agent that is used for gum Arabic replacer in hard gums such as pastilles.

The popularity of plant-based foods has led to a demand for starches for the development of 100 % gelatin-free products. Emsland Group has developed **Emden® ET 15** and **Emden® ET 50** that offer our customers the ability to develop plant-based gums

and jellies. Next to this, the **Emden® ET-starches** have the advantage of being thermostable. Whereas gelatin-based products already melt at 40 °C, products with **Emden® ET** do not melt up to 80 °C. This is an advantage when gums are subjected to high temperatures.

Emden® ET 50 is very suitable for production of jellies in continuous cooking systems. Due to a relatively high processing viscosity, this product is less suitable for batch cooking. **Emden® ET 15** has a much lower process viscosity and is therefore suitable for all confectionary cooking processes including batch cooking and open pan/kettle cooking. The low viscosity of **Emden® ET 15** also allows producers to increase the dry solid content, offering the possibility to dry the jellies at room temperature.

Chewable Confectionary and Marshmallows

Gelatin Replacement & Plant Based

Also in this confectionary category, gelatin replacement is on the top of the mind of producers.

Emden® ET 15 can replace part of the gelatin in chewable confectionary and marshmallows. In

combination with functional vegetable proteins, plant-based products are obtained.

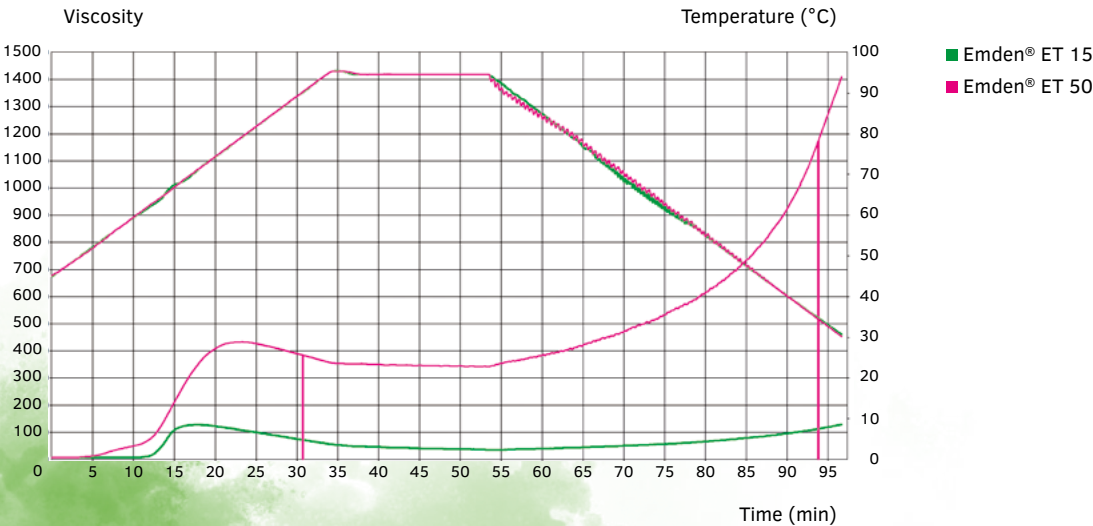


Process Conditions for Jellies

	Emden ET 50	Emden ET 15*
Equipment	Continuous cooking	Continuous or Batch cooking
Premix temperature	40–50 °C	40–50 °C
Moulding temperature	85–90 °C	85–90 °C
Cooking temperature	128–132 °C	128–132 °C
Dry solid content	70–72 %	74–76 %
Drying conditions	36 hours, 50 °C	36 hours, 50 °C

All products are registered®

* Suitable for all cooking systems (open pan, batch, continuous, extruder)



Extruded Confectionary

Gluten Free and Plant Based

In extruded confectionary, wheat flour, which contains gluten, is often used. Wheat flour leads to a short texture, the products are not clear and there is a grainy off-taste. One of the largest challenges in extruded confectionary is to develop gluten-free products.

Emsland Group has developed **Empure® ES 300** and **Emden® ET 50** for the development of gluten-free extruded confectionary. This concept

leads to gluten-free products with a high clarity that do not have a cereal-like off-taste. Compared to wheat flour, the dosage of starches can be reduced by 50 %.

The sugar paste filling of extruded confectionary is usually bound with gelatin. Emsland Group has developed **Emjel® LC 15** for the replacement of gelatin in confectionary fillings of extruded confectionary.

Products for Confectionary

	Emox C 70 S	Emes KSA 1502	Emes KOA 3005	Emden ET 50
Applications	Jellies and gums	Jellies and gums	Gums and pastilles	Multiple applications, see table
Type	Cook-up modified potato starch (E1404)	Cook-up modified potato starch (E1420)	Cook-up modified potato starch (E1451)	Cook-up modified starch (E1442)
Description	Gelling starch for partial gelatin replacement in jellies and gums	Gelling starch for partial gelatin replacement in jellies and gums. Gives a softer gelled texture than Emox C 70 S	Starch that gives a hard texture. It can replace gum Arabic	Gelling starch with excellent elastic texture and high clarity



Coated Confectionary

Production Speed

A typical example for coated confectionary is the Jelly Bean. Jelly Beans are characterized by a short bite and are commonly produced with gelling starches. These starches need to be fast gelling in order to speed up production and save energy costs of drying time. **Emden® ESH 15** is a fast gelling modified pea starch that leads to Jelly Beans with a short texture.



Emden ET 15	Empure ES 300	Emjel LC 15	Emden ESH 15
Multiple applications, see table	Gluten-free extruded confectionary	Confectionary fillings, extruded confectionary	Jelly bean centers
Cook-up modified starch (E1440, E1442)	Cook-up clean label pea starch	Pre-gelatinized modified starch (E1442)	Cook-up modified pea starch (E1440)

Gelling starch with excellent elastic texture and high clarity	Fast gelling clean label pea starch with a very short texture (comparable to pectin)	Instant gelling starch that can replace gelatin as binder in sugar paste	Fast gelling modified pea starch with a short texture
--	--	--	---

All products are registered®

Application overview and usage levels of Emden® ET 50 and 15

Emden® ET 50 and **15** are multifunctional starches and can be used in several confectionary segments. The usage levels of these starches depend on the segment and the desired texture.

Application	Emden ET 50	Emden ET 15
Jellies	7 – 9 %	10 – 12 %
Chews	1 – 3 %	2 – 4 %
Jelly bar	10 – 12 %	12 – 16 %
Marshmallow	2 – 4 %	6 – 8 %
Extruded confectionary	14 – 18 %	14 – 20 %
Fillings	1 – 3 %	4 – 6 %

All products are registered®

Chocolate Bars

The Emsland Group has plant-based solutions available to allow enrichment of chocolate bars with

Empro® pea protein isolates or with **Emfibre®** pea fibers.

Products for Chocolate Bars

	Empro E 86 F 30	Emfibre EF 60
Type	Pea protein isolate with minimum 84 % protein content	Pea fiber
Description	Pea protein with fine particle size that is very suitable for protein enrichment in food applications such as chocolate bars	Fine pea fiber that is suitable for chocolate bars

All products are registered®

CONFECTIONERY CONCEPTS



EXTRUDED CONFECTIONERY

- **Outer Gum:** Gluten-free, no off taste (no wheat flour)
- **Sugar Paste Filling:** Sustainable alternative for gelatin

Emden®
ET 50

Emjel®
ET 50



JELLY GUM

- Excellent elastic texture
- Sustainable alternative for gelatin
- Suitable for multiple cooking processes

Emden®
ET 15



2-INGREDIENT JELLY GUM

- **Ingredients:** Fruit concentrate, modified starch
- Short label
- No added sugar

Emden®
ET 15



SUGAR-COATED FRUIT GUM

- Short, cuttable texture
- Pectin replacement
- E-number free

Empure®
ES 300



MARSHMALLOW

- Partial gelatin replacement
- Improved thermostable texture
- Cost saving

Emden®
ET 15



PARTIAL GELATIN REPLACEMENT

- Cost-efficient solution
- Gelatin reduction by 15%, 30%, or 40%

Emox®
C 70 S



WINE GUM

- Partial gelatin replacement
- Cost saving
- Texture variation

Emox®
C 70 S

Emes®
KSA 1502

Emox®
KO 12

Emes®
KOA 3005



About the Emsland Group

Using nature to create is the guiding principle of the Emsland Group. As a global leader in refined products made from potatoes and peas, we offer a wide range of innovative products with the high quality and reliability that the Emsland Group name is known for.

Our plant-based ingredients include native, clean label and modified potato and pea starches, proteins and fibers, as well as potato flakes and granules, which can be used as thickeners, binding agents, emulsifiers and stabilizing additives for various applications. We serve a variety of industries and offer solutions for trends such as clean label, kosher, halal, gluten-free, vegan, fiber enriched, sustainability, as well as non-GMO raw materials.

Innovation is a core driving force at the Emsland Group. Experts at our Innovation Centre in Germany are constantly developing and optimising products and concepts to meet the evolving demands of both the industry as well as the end user. We work closely with customers to further develop our product portfolio and overcome challenges in a sustainable way.

Sustainability is a responsibility that, for us, does not begin in the factory, but in the field. Since 1928, we have been relying on the innovative power of nature and working in harmony with our natural resources in all our endeavours. Our team is dedicated to continuously working to develop products that are in line with newer sustainability benchmarks, helping to drive the global trend towards more environmentally friendly and sustainable options through the production of plant-based solutions.

The Emsland Group offers product solutions for the following food segments:

- Bakery
- Confectionary
- Dairy & Alternatives
- Food Coating
- Meat Analogues
- Meat, Poultry & Seafood
- Noodles & Gluten-Free Pasta
- Potato Products
- Potato Snacks
- Retail & Food Service
- Soups & Sauces

The table below offers an overview of the most common applications of our products in all food segments. For more complete information on the Emsland Group's products and applications, please contact us at info@emsland-group.de.

Ingredients	Functionality	Food applications
Potato flakes <i>Emflake</i>	Texturizing, expansion, forming	Snacks, potato products, bakery
Potato granules <i>Emgranule</i>	Texturizing, expansion, forming	Snacks
Native pea and potato starch	Thickening, texturizing, water binding, expansion, anti-caking	Soups, sauces, noodles, meat, snacks, gluten-free products
Modified pea and potato starches <i>Emes, Emflo, Emden, Emox</i>	Thickening, texturizing, gelling, binding, expansion, forming	Snacks, soups, sauces, confectionary, food coating, baked goods, processed cheese and alternatives, meat and analogues, noodles
Cold water swelling or soluble native and modified starches <i>Emjel, Emfix</i>	Instant thickening, texturizing, binding, emulsifying	Snacks, soups, sauces, bakery fillings, baked goods, cheese and alternatives
Potato and pea dextrins <i>Emdex</i>	Film forming, texturizing (crispiness)	Food coating, filler, binder
Clean label pea and potato starches <i>Empure</i>	Thickening, gelling, texturizing, binding	Soups, sauces, potato products, meat analogues
Waxy potato starch <i>Emwaxy</i>	Expansion, thickening, texturizing	Snacks, meat, noodles, cheese alternatives, fruit preparations, bakery fillings
Pea protein isolate <i>Empro</i>	Nutrition (protein enrichment), texturizing, emulsification	Meat analogues, dairy alternatives, bakery, snacks
Pea and potato fiber <i>Emfibre</i>	Nutrition (dietary fiber, water and fat binding)	Meat and analogues, bakery, snacks
Blends <i>Embat</i>	Film forming, texturizing	French fry coating, tempura & adhesion batter

All products are registered®

The Emsland Group is committed to producing consistently high-quality ingredients. Customer health and safety, as well as transparency regarding our manufacturing methods, are top priorities.

To view a complete list of our certifications and qualifications, scan the QR code or visit www.Emsland-Group.com





EMSLAND GROUP[®]

using nature to create

Contact Us

Emsland-Group.com

+49 5943810

info@emsland-group.de

Emslandstrasse 58

49824 Emlichheim Germany

Disclaimer: All information and data in this brochure are in accordance with the best practise experiences and laboratory examinations of Emsland-Stärke GmbH and Emsland Food GmbH hereafter called Emsland Group. The indications are based on the current state of development, technology and research and should be taken as information on the products of Emsland Group, but must not be understood as promise of characteristics.

Emsland Group cannot assume liability for the product information and products, as the conditions under which the stocking, treatment and processing occur are out of the control of Emsland Group.

Liability claims against Emsland Group which refer to material or immaterial damages caused by the use or disuse of the offered products and product information of Emsland Group are basically exempted, unless demonstrably intended or grossly negligent fault exists which directly caused the damage. In particular Emsland Group assumes no liability that the offered products or product information are economically utilizable, technically executable or useful or that the offered products and product information do not infringe the rights of third persons.