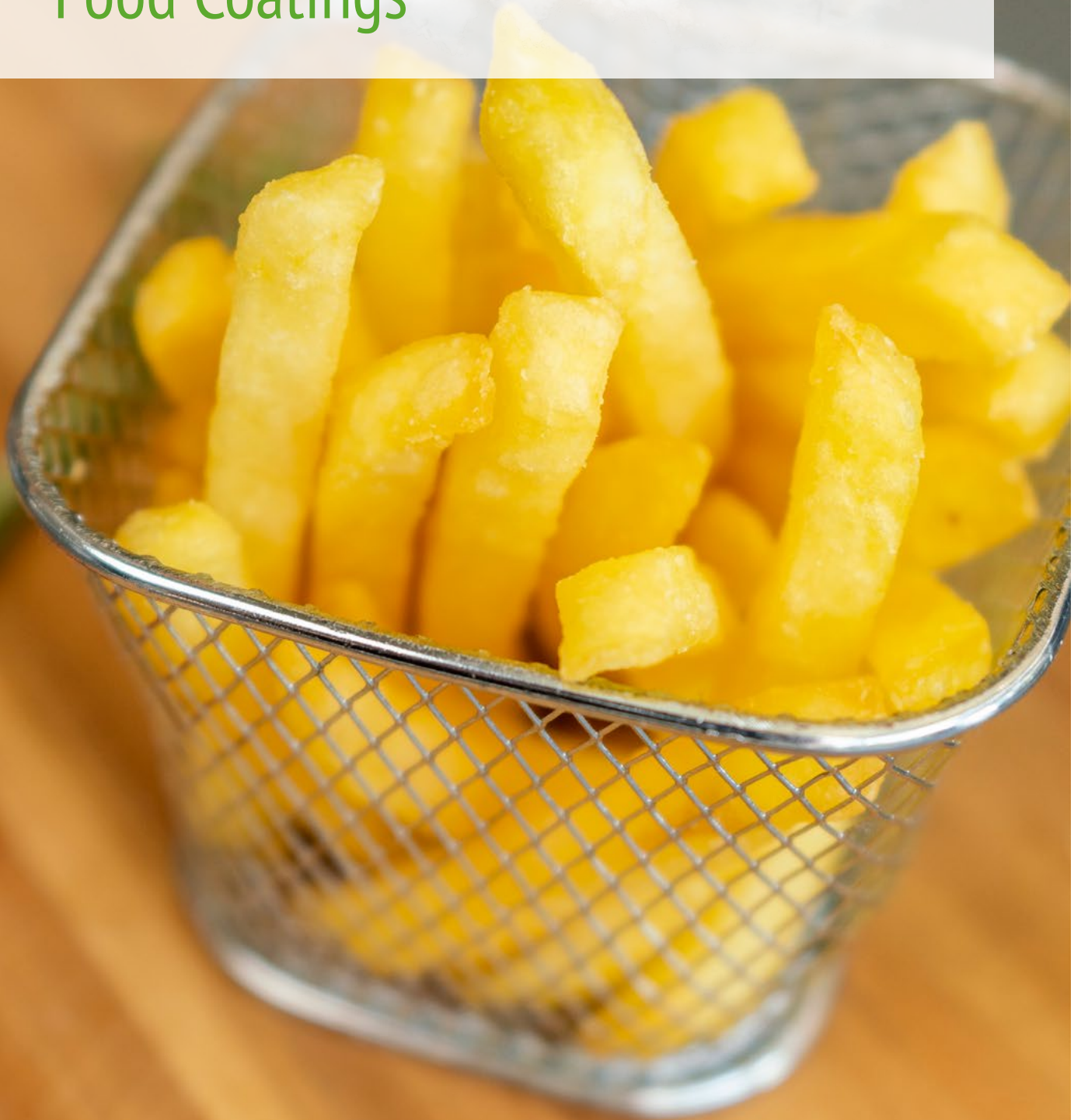
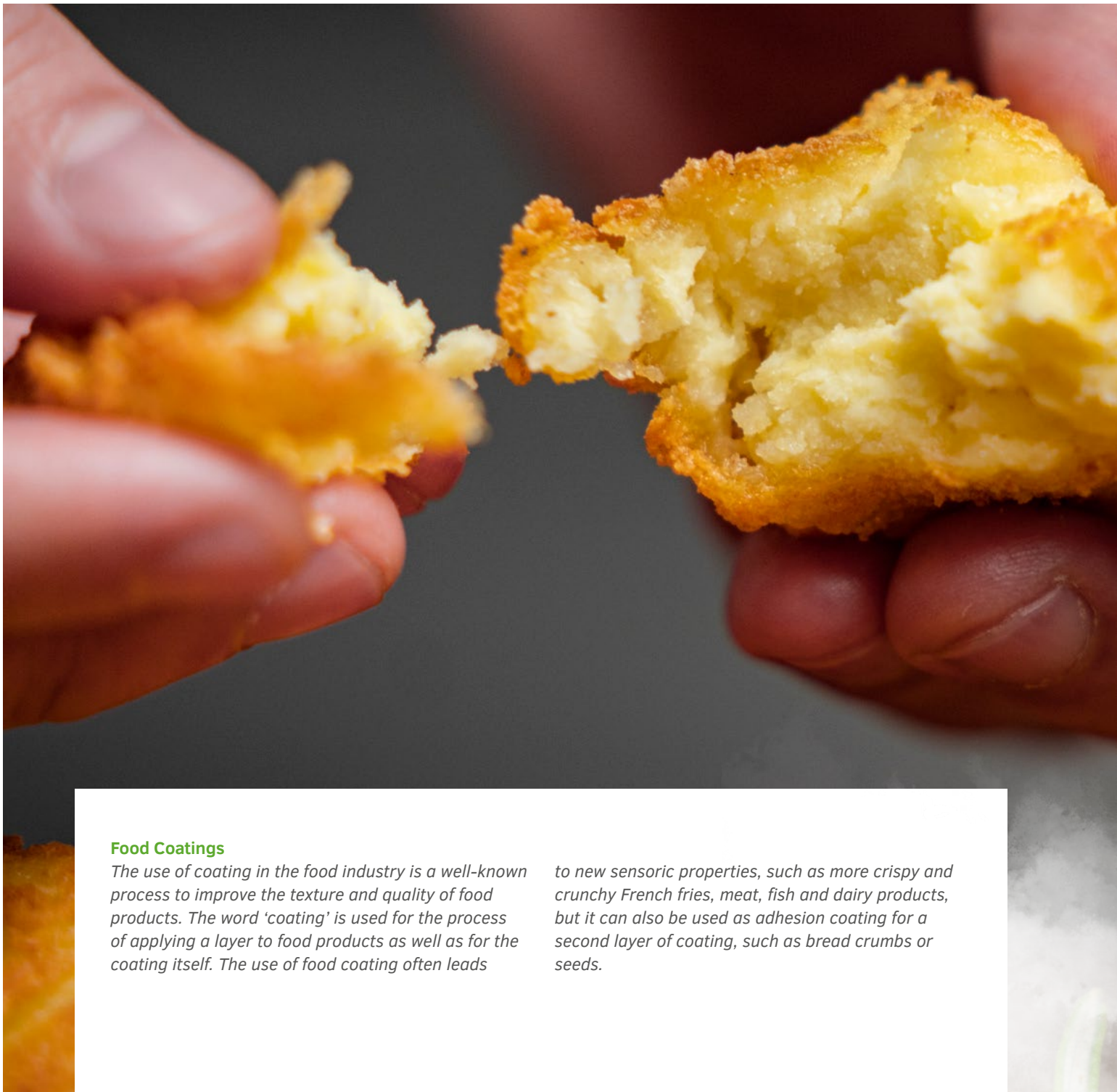


EMSLAND GROUP[®]
using nature to create

Food Coatings





Food Coatings

The use of coating in the food industry is a well-known process to improve the texture and quality of food products. The word 'coating' is used for the process of applying a layer to food products as well as for the coating itself. The use of food coating often leads

to new sensoric properties, such as more crispy and crunchy French fries, meat, fish and dairy products, but it can also be used as adhesion coating for a second layer of coating, such as bread crumbs or seeds.

Emsland Group Ingredients

The Emsland Group has solutions for different types of food coatings such as French fry coating, also called clear coating, as well as for adhesion and tempura batters. These food coating solutions are based on pea and potato ingredients and therefore

offer solutions for gluten- and allergen-free products. Additionally, potato flakes can be used as a gluten-free alternative for wheat flour-based bread crumbs.



French Fry Coating

Crispy Texture with long Holding Time

French fries are a popular side dish that is consumed in large quantities in restaurants and especially cafeterias and fast food chains. After frying, the French fries are hot and crispy, but after some time the texture can become soggy and wet. Fast food chains use heating lamps to keep the French fries warm, but it is a challenge to maintain the crispiness. As home delivery grows in popularity, the same challenge can be seen here.

The solution for maintaining the crispiness is to apply a coating on the French fries. This coating prevents the leaching of moisture from the core and keeps the fries crispy. Potato-based ingredients are often preferred as it is more natural to use potato-on-potato, rather than ingredients from other sources. However, pea starch based ingredients are also increasingly found in this application. The high amylose content of pea starch leads to excellent film forming properties and a crispy texture.

The Emsland Group offers **Embat®**, ready to use gluten-free blends for French fries, as well as single ingredients **Emflo® KV 20** starches and **Emdex®** potato dextrins for the customers, that make their own specific blends. Next to this, the Emsland Group also has developed **Emjel® EP 300** for stabilizing the viscosity of the batters. This product can be used to replace xanthan gum in batter formulations.

Embat® 2000 is a standard blend for French fries. **Embat® 11384** is a new coating system especially developed for home delivery French fries. This segment has gained importance in recent years and brings new challenges as French fries become easily soggy when packed. Due to a unique combination of ingredients, **Embat® 11384** is able to increase the crunchiness time of packed French fries up to 30 minutes.

Emdex® KS 1025 and **Emdex® White Diko** are potato dextrins that are developed for French fry coatings. These dextrins form a crispy film around the French fries.

Blends and Single Ingredients for French Fry Coating (Clear Coatings)

	Embat 2000	Embat 11384	Emflo KV 20	Emdex KS 1025
Type	Blend of different ingredients	Blend of different ingredients	Cook-up modified potato starch (E1412)	Potato dextrin
Description	Golden standard for French fry coating. It extends holding time while using a heat lamp and extends the crispiness of the French fries	New innovative blend for French fry coating, especially developed for home delivery	Modified potato starch that is typically used to provide crispiness in French fry coatings	Provides adhesion, good film forming and crunchy texture



Flours/Thickener

- Texture
- Stabilising of viscosity

Starch

- Film forming
- Fat reduction
- Crispness/Hardness

Dextrin

- Adhesion
- Browning reaction
- Fat reduction

Emdex White Diko	Emjel EP 300
Potato dextrin	Pre-gelatinized modified potato starch (E1414)
Provides adhesion, good film forming and crunchy texture	High viscous starch that can be used to replace xanthan gum in batters

All products are registered®



Emsland Group Dextrin Portfolio

The white dextrins of the Emsland Group are powders that differ in conversion grade. This offers a toolbox to influence texture and fat absorption.

	Emdex KS 1025	Emdex White Diko
Differences	Cold water solubility approx. 15 % Builds firm gels Gels have elastic texture	Cold water solubility approx. 50 % Builds pasty gels Gels are spreadable and white

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Products for Gluten-Free Batters and Breadings

	Emden ESH 15	Emdex KS 1025	Embat 2000	Emflake 3923
Applications	Tempura batter	Tempura batter	Adhesion batter	Gluten-free breading
Type	Cook-up modified pea starch (E1440)	Potato dextrin	Blend of different ingredients	Potato flake
Description	Gelling component of tempura batters that provides a crunchy texture	Film forming component of tempura batters that provides adhesion and a crispy texture	Gluten-free adhesion batter for various substrates	Fine potato flake for a homogeneous look and a crispy texture



Gluten-Free Batters and Breadings

Most coatings, including tempura and adhesion batters and breadings, are based on wheat flour. Gluten free is an important market trend and therefore there is a need for gluten-free concepts for coatings as well. The Emsland Group has developed various gluten-free coating concepts based on potato and pea starches.

Tempura Batters

Tempura batters are crispy and airy coatings that are used for meat, poultry, fish and vegetables. These batters increase the look and texture of the core component. In general, tempura batters are based on wheat flour and leavening agents that puff upon

frying. The Emsland Group has developed a recipe for gluten-free tempura coatings where a combination of **Emden® ESH 15** in combination with **Emdex® KS 1025** is used.

Adhesion Batters and Breadings

Adhesion batters are used to stick the breading particles to the substrate. Adhesion batters and breadings are also usually based on wheat flour. The Emsland Group has developed an adhesion batter **Embat® 2000** and offers a portfolio of **Emflake®** potato flakes that are perfect for use as gluten-free breading.

Emflake 3915	Emflake 3822
Gluten-free breading	Gluten-free breading
Potato flake	Potato flake

Medium coarse potato flake that provides a more flaky appearance

Coarse flake for a home-style coating and a crunchy texture

All products are registered®





Coated Nuts

Texture & Expansion

Coated nuts are nuts (usually peanuts), covered with a flavoured crispy layer. The layer consists of starches or flours and sometimes granules and flakes. Texture and expansion are two important qualifiers for coated nuts. It is important that the expansion is even and that the air bubbles are homogeneous without leaving room between the nut and the coating thus preventing the so-called rattle effect.

Potato starches are excellent ingredients for coated nuts. Texture variation can be created by using a mix of regular potato starch and **Emwaxy®** waxy potato starches. In general, **Emwaxy®** leads to high expansion and a lighter texture.

Products for Nut Coating

	Potato starch	Emwaxy 100	Emjel E 70
Type	Native potato starch	Native waxy potato starch	Pre-gelatinized potato starch
Description	Potato starch that provides good expansion. It shows a crunchy texture after preparation	Waxy potato starch that provides excellent and homogeneous expansion. The texture after preparation is very crispy and light.	Cold water binding starch that is used as a binder in the coating process. It provides a crunchy texture



Emjel P	Emwaxy JEL 100
Pre-gelatinized modified potato starch (E1412)	Pre-gelatinized waxy potato starch
Cold water binding modified potato starch that is used as binder in the coating process. It provides uniform expansion and a crunchy, slightly hard texture	Cold water binding waxy potato starch that is used as a binder in the coating process. It provides a uniform expansion and a light crispy texture

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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

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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





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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.

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