



EMSLAND GROUP[®]
using nature to create

Meat Analogues



Meat Analogues

Meat analogues are products made from plant-based raw materials that have a meat-like texture and taste. Due to continuing consumer demand, manufacturing processes and ingredients are being continuously optimized and refined to achieve the desired meat-like qualities in a diverse range of products. Potato and

pea-based raw materials such as protein, fibers and starches form the basis for meat analogues, helping to improve the texture properties, firmness, tenderness, product binding, and juiciness of the final products.

Emsland Group Ingredients

Pea protein isolates are a good basis for the production of texturized proteins for meat analogues. They make it possible to create fibrous, meat-like textures and thus represent the most important component of texturized proteins for meat analogues. In addition, they can be used for protein enrichment, enabling meat analogues to achieve a protein content similar to that of meat.

Starches can be used for product binding or to adjust the product firmness of meat analogues. The Emsland Group produces pea and potato starches as well as waxy potato starches. These are offered in native, clean label, or modified form.

Pea and potato fibers are dietary fibers that are very suitable for use in meat analogues to positively influence the texture due to their high water- and oil-binding capacity. These fibers can be used in the production of texturized proteins where they enhance the firmness and fibrous structure or they can be used in the end application, to ensure that these products have better water binding properties and stability when heated.





Dry Texturized Vegetable Proteins (TVP) & Wet/High Moisture Meat Analogues (HMMA)

Texture & Nutrition

Dry and wet texturized vegetable proteins are the base for meat analogue products. These texturized proteins are produced using a special extrusion process where the structure of a protein is changed in such a way that it forms a fibrous texture. Extruder conditions play an important role in obtaining the desired texture but also other ingredients, such as the type of plant-based proteins, starches and fibers play an important role.*

Dry extrudates/TVP are produced with a very low moisture content. They must be hydrated before use to regain their fibrous/meat-like texture. These dry TVP are used, for example, in minced meat imitations and vegan burgers.

Wet extrudates/HMMA are manufactured with high moisture content. In these products, the fibrous meat-like texture is formed in a special cooling die,

Products for the Production of Dry and Wet Extrudates

	Empro E 86	Empro E 86 HV	Native potato starch
Applications	Dry extrudates	Dry and wet extrudates	Dry and wet extrudates
Type	Pea protein isolate with minimum 84 % protein content	Pea protein isolate with minimum 84 % protein content	Potato starch
Description	First generation functional pea protein for texturized proteins	High viscous functional pea protein developed especially for dry and wet extrusion: high and even expansion and good fibrous texture	Adjusts the texture of the texturized proteins and supports high and uniform expansion



which is added after the extrusion process. The products are used, for example, in vegan cut meat (such as gyros), chicken analogues or products similar to cured meat.

The Emsland Group has developed a range of **Empro®** functional pea proteins that serve as protein source in texturized proteins. Next to that, native potato starch and **Emflo® KPS 200** can be used to

facilitate the extrusion process and obtain sufficient and even expansion. An improved firm and fibrous texture can be obtained by adding **Emfibre®** pea or potato fibers.

*Desired texture is dependent on local preferences

Emflo KPS 200	Emfibre EF 200	Emfibre KF 500
Dry and wet extrudates	Dry and wet extrudates	Dry and wet extrudates
Cook-up modified potato starch (E1412)	Pea fiber	Potato fiber

Modified potato starch for improved firmness and texture of extrudates

Light coloured pea fiber that improves firmness and fibrous texture of texturized proteins – especially suitable for light coloured products such as poultry analogues

Coarse potato fiber that improves firmness, fibrous texture and stability over time of texturized proteins

All products are registered®

Binding and Texturizing Agents for Meat Analogues

Texture & Forming Properties

Plant-based products, such as vegan burgers or sausages, require binding agents to be able to be formed into the desired shapes. These binding agents should also provide form stability under storage conditions and during preparation of the product. A challenge for binding agents is the texture of the product at the moment of consumption – juicy but no too soft or mushy.

Strong gelling starches can support the texture of a plant-based sausage or burger. Both potato and pea starch are known for their good gelling properties: potato starch for its elastic gelling properties and pea starch for its fast gelling properties and short texture. The Emsland Group has developed a range of clean label **Empure®** gelling pea and potato starches to fulfill the texture requirement of meat analogues.

Products for Binding and Texturizing Meat Analogues

	Empure KJEL 200	Empure ES 300	Emden ESH 15	Emfix K 02
Applications	Formed meat analogues	Formed meat analogues	Vegan sausages and vegan elastic fat	Emulsion gel and vegan elastic fat
Type	Clean label pre-gelatinized potato starch	Cook-up clean label pea starch	Cook-up modified pea starch (E1440)	Pre-gelatinized emulsifying modified potato starch (E1450)
Description	Gelling potato starch that combines cold binding properties and fast gelling with a good texture of the end product	Pea starch with fast gelling properties	Gelling starch that gives firm and elastic gels, suitable for vegan sausages that are heated during processing or for the formation of vegan elastic fat, also prevents syneresis	Emulsifying starch to create an emulsion gel for e.g. vegan burger or vegan elastic fat for e.g. salami



The Emsland Group also offers **Emfix® K02**, an emulsifying starch for the formation of emulsion gels as a component for meat analogues. Together with a gelling starch, such as **Emden® ESH 15**, a vegan elastic fat can be obtained that is suitable for vegan salami types. **Emden® ESH 15** also prevents syneresis.

Emfibre® pea and potato fibers have good water and fat binding properties that will prevent cooking loss and maintain a juicy texture of the meat analogue.

Emfibre EF 200	Emfibre KF 500
Poultry alternatives	Vegan burgers and sausages
Pea fiber	Potato fiber

Light coloured pea fiber with good water- and fat-binding properties, advised for end products with a light colour (poultry alternatives)

Potato fiber with high water- and fat-binding properties, advised for burgers and sausages

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Vegan Coatings

Egg and Gluten Free

The Emsland Group offers batters for vegan and gluten-free coatings. **Embat® 2000** represents an alternative to the conventional coating with egg

and/or wheat flour. **Embat® 2000** ensures a good and uniform adhesion and a long-lasting crispy texture.

Vegan Gluten-Free Coating for Meat Analogues

	Embat 2000
Type	Blend of different ingredients
Description	Provides excellent adhesion and crispiness to the coated product

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Vegan Fat Elastic – Low melt

Ingredients	Amount [%]
Water	56.8
Fat	21.5
Emden® ESH 15	18.0
Emfix® K02	2.2
Salt	1.3
Citric Acid	0.1

Preparation (Thermomix):

General: Knife counter-clockwise, no butterfly mixer

- Mix dry ingredients
- Add water and fat to Thermomix, set to speed to ~2.5 heat to max. 55°C in order to melt the fat
- Set speed to 4, add dry blend slowly while mixing (use a funnel)
- Set speed to 3.5, set heat to 80°C
- Hold temperature for 5 minutes
- Mould the product – avoid air in the packaging
- Store at chilled conditions (6°C – 8°C) for 5 days



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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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.

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