ATLANTIS-PAK

Leader In Innovative
Packaging Solutions

iPeel CASING

Process Operating Manual

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1. APPLICATION

iPeel is an easy-peel plastic casing permeable to process smoke and designed for production of all types of frankfurters, wieners, hot dogs, and mini-sausages made by the traditional technologies that involve the stage of smoking (smoke roasting), which makes it possible to obtain products with traditional sensory characteristics typical of products packaged in cellulose, collagen, and natural casings.

The **iPeel** casing (type **A,** type **R**) is intended for finished products processable by means of automatic peelers. At the same time, the **iPeel** casing is used for the production and subsequent storage of the finished products (festoons). Secondary packaging is recommended to preserve the sensory characteristics of the products for a longer period.

iPeel is the first-ever plastic casing designed for removal by peelers, and is made by the manufacturer's original technology from blends of high-quality materials developed for Atlantis-Pak by leading suppliers of polymers. The quality of the raw materials used for production of the casing is confirmed by Russian and international quality certificates.

2. PROPERTIES AND ADVANTAGES OF THE iPeel CASING

2.1. Specifications of the casing

2.1.1. The **iPeel** casing is made on advanced equipment, which ensures:
- continuous control of all parameters;
- maximum automation of the production process

2.1.2. The basic quality characteristics and test conditions for the **iPeel** casing are shown in regulatory documentation.

2.2. Advantages of the casing

2.2.1. **Removal of the casing by peelers.** The **iPeel** casing is made by a proprietary technology, and its properties make it possible to remove the casing off the finished product by means of automatic peelers (type **S-A,** type **S-R**).

2.2.2 **Optimal adhesion of the iPeel casing** to various types of emulsions provides for easy removal of the casing off the finished product by means of automatic peelers (type **A**, type **R**). At the same time the casing adequately protects the finished product (festoons) during the storage.

2.2.3 **High permeability of the casing** to process smoke and water vapor makes it possible to roast and smoke the products to impart to them the traditional smoked taste and flavor. Products can be made with the traditional sensory characteristics typical of foodstuffs packaged in cellulose, protein, and natural casings. This also contributes to formation of a dense coagulated protein crust with a glossy surface of the product under the casing, which provides for consistent removal of the casing off the finished product without damaging the surface layer of coagulated protein (crust).

2.2.4 **Wider assortment of products.** The **iPeel** casing is supplied straight or ring-shaped, which extends the range of products by diversification of their appearance. The ring-shaped version of the **iPeel** casing makes it possible to supply products in the shape of half rings, without the use of expensive natural or collagen casings, and to remove the casing by peelers.

2.2.5 The **high heat resistance** of the polymers used to make the **iPeel** casings significantly extends the temperature range of utilization of the casing in comparison with collagen and cellulose casings.

2.2.6. The **high mechanical strength** of the **iPeel** casing makes it possible to mold the products by using various types of equipment to achieve a high speed of production and overstuffing relative to the nominal caliber. The caliber consistency in the **iPeel** casings provides for stable filling on the modern high-capacity frankfurter lines and stuffers with twisting devices.

2.2.7. **Microbiological resistance**. The materials used for production of the **iPeel** casings are inert to the action of bacteria and mold fungi. This improves the hygienic characteristics of both the casing itself, and the finished products.

2.2.8. The **high oxygen barrier properties** compared with collagen and cellulose casings at the finished product storage temperatures provide for the following advantages:

- reduction of oxidation processes in the finished products;
- better preservation of the smoked flavor in the finished products until removal of the casing by means of a peeler, and throughout the shelf life of the product (festoon)
- reduced weight losses (≈2-5%) during the storage (the products should be stored in a gas atmosphere inside a vacuum packing);

- retardation of the syneresis process (separation of moisture) in the finished product inside a vacuum packing (≈1.5 – 2 times).

3. ASSORTMENT

iPeel type **A** has a closed end in the shirred stick; the casing is designed for use on automatic equipment;

iPeel type **S-A** has a closed end in the shirred stick; the casing is designed for use on automatic equipment with an option of removal of the casing off the finished product by means of automatic peelers;

iPeel type **U-A** has a closed end in the shirred stick; the casing is designed for use on automatic equipment and selling of all kinds of sausages in chain for separation;

iPeel FE type **A** has a closed end in the shirred stick; the casing is designed for use on automatic equipment with low quantity of KMnO4 consumed;

iPeel A3 type **A** is an economy version of the iPeel casing, has a closed end in the shirred stick; the casing is designed for use on automatic equipment and selling of all kinds of sausages in chain for separation;

iPeel type **R** has an open end in the shirred stick and is designed for manual tying and use on stuffers with twisting devices;

iPeel type **S-R** has an open end in the shirred stick and is designed for manual tying and use on stuffers with twisting devices with an option of removal of the casing off the finished product by means of automatic peelers;

iPeel type **U-R** has an open end in the shirred stick and is designed for manual tying and use on stuffers with twisting devices, for selling of all kinds of sausages in chain for separation;

iPeel FE type **R** has an open end in the shirred stick and is designed for manual tying and use on stuffers with twisting devices, with low quantity of KMnO4 consumed;

iPeel A3 type **R** is an economy version of the iPeel casing, has an open end in the shirred stick and is designed for manual tying and use on stuffers with twisting devices, for selling of all kinds of sausages in chain for separation;

iPeel type **Ako** is a ring-shaped casing with a closed end in the shirred stick, designed for use on automatic equipment;

iPeel type **Rko** is a ring-shaped casing with an open end in the shirred stick, designed for manual tying and use on stuffers with twisting devices;

iPeel-Gut is a matte plastic casing designed for production, transportation, storage and sale of traditional wieners, hot dogs and mini-sausages.

The **iPeel** casings are supplied shirred. The parameters of the casing are shown in Table 1.

Table 1

Caliber of casing, mm	Stick type	Shirring type	Length of casing in stick, m (± 2%)
16	A / R	hard	25.0
17	A / R	hard	25.0
18	A / R	hard	25.0
19	A / R	hard	25.0
20	A / R	hard	25.0
21	A / R	hard	25.0
22	A / R	hard	25.0
22	Ako / Rko	hard	25.0
23	A / R	hard	25.0
24	A / R	hard	33.3
24	Ako / Rko	hard	25.0
25	A / R	hard	33.3
26	A / R	hard	33.3
27	A / R	hard	33.3
28	A / R	hard	33.3
29	A / R	hard	33.3
30	A / R	hard	33.3
31	A / R	hard	33.3
32	A / R	hard	33.3
32	R	soft	30.0
32	Rko	soft	30.0
34	A / R	hard	33.3
34	R	soft	50.0 (30.0)
34	Rko	soft	30.0
36	R	soft	50.0 (30.0)
36	Rko	soft	30.0

38	R	soft	50.0 (30.0)
38	Rko	soft	30.0
40	R	soft	50.0 (30.0)
40	Rko	soft	30.0

Assortment of the iPeel-Gut products

Table 2

Caliber of casing, mm	Stick type	Color range	Printing	Length of casing in stick, m	Length of stick, mm	Shirring type	
						soft	hard
30	A	Clear Light smoke Smoke Orange Dark orange	from 1+0 to 4+2	33.3	245		+
32	A			33.3	245		+
30	R/Rko			38/33.3	360/ 245	+	+
32	R/Rko			38/33.3	470/245	+	+
34	R/Rko			38	470	+	
36	R/Rko			38	470	+	
38	R/Rko			38	470	+	

Colors of the **iPeel** casings: full range is in the Color Catalogue.
The color range of the casings is subject to change.
Single- or double-side printing is possible on the casing.
The number of print colors is from 1+0 to 6+6.
Printing is made in inks impervious to process smoke.
The **iPeel** casing is supplied shirred and packaged under vacuum in accordance with the requirements of international standards.
This provides for:

- ideal sanitary/hygienic condition of the product during the transportation to the production shop (without the carton) and storage;
- reduction of waste disposal costs (fewer used cartons).

4. CASING USE TECHNOLOGY

4.1. Storage and transportation of the casing

4.1.1. The casing must be stored in the original packing in closed dry and clean rooms conforming to the sanitary-hygienic standards for the relevant sector of the food industry, at a distance of not less than 1m from heaters, in the absence of strong-smelling or corrosive substances, at a temperature from +5 to +35°C and air relative humidity of not more than 80%.
4.1.2. The **iPeel** casing must be transported at a temperature not exceeding +40°C, and protected against direct sunlight.
4.1.3. If the casing was transported at a temperature below +5°C, hold it at room temperature for not less than 24 hours before opening of the packing and use.
4.1.4. Never drop the boxes with casings or subject them to impacts.

4.2. Preparation of the casing for use

The procedure for preparation of the **iPeel** casing for processing consists in the following:

Bring the original packing to the production shop from the store, put it on a dry surface (table), then open the manufacturer's packing immediately before processing of the casing;

The **iPeel** casing (hard shirring type) does not require soaking before use, because the high elasticity of the casing easily provides for the recommended stuffed caliber. This not only improves the throughput, but also ensures a high hygienic level of production.

The **iPeel** casing (soft shirring type) requires immersing into potable water at a temperature 25-30 °C. The immersion time is 2-3 minutes.

Extract the shirred casing rods from the packing in such a way as to preserve integrity of the shirring.

In order to ensure integrity of the shirred rod after opening of the manufacturer's packing, avoid moisture getting on the casing before its use.

Throughout the technological cycle of production, take care to avoid damage of the casing. Especially harmful is contact with various burrs, uneven or rough surfaces, etc.

4.3. Preparation of the emulsion

For production of frankfurters and wieners in the **iPeel** casing the quantity of the moisture added to the emulsion must be the same as for collagen or cellulose casings.

In the development if new recipes according to the regulatory documentation, the amount of the added water should be determined with regard to the moisture-retaining properties of the gelling agents used (such as carrageenans, plant or animal proteins, etc.), and the relevant instructions on use must be followed to avoid formation of water and fat pockets.

4.4. Molding of the products

Molding of the **iPeel** casing starts with inspection of the equipment and the work table.

Make sure that there are no burrs on the equipment parts, or sharp objects, indentations, or rough areas on the working surface of the table, in order to avoid damages to the casing.

Never puncture the products (perforate the casing). The casing will burst, if punctured.

When using stuffers with twisting devices, observe the direction of stuffing - the shirred sticks must be put onto the horn with the 'herring-bone' inward, i.e. with the 'herring-bone' apex towards the stuffer.

In the molding of the products, bear in mind that the packing indicates the minimal stuffed caliber.

To prevent a 'zebra' effect after smoking of the products, strictly observe the following rules during the molding:

- never touch the shirred stick with wet hands (keep the hands dry!) when putting it into the feed hopper;
- keep the feed hopper dry.

Failure to comply with these rules may result in appearance of spiral stripes of a darker color on the products after thermal processing.

The stuffed caliber for the **iPeel** casing depends on the further use of the finished product. When the finished products are intended for subsequent removal of the casing by means of peelers, it is recommended to use the minimal stuffed caliber, e.g. for the 20mm nominal caliber, the recommended stuffed caliber is 21 to 21.5mm.

If the products will be stored and sold with the casing on (in festoons), the recommended stuffed caliber is 22.0 to 22.5mm.

Table 3 contains the recommended stuffed calibers for removal of the casing on peelers, and for storage of the products inside the casing (in festoons).

It should be borne in mind that the actual stuffed caliber and the molding rate may vary not only with the technical condition of the molding equipment, but also depending on the emulsion temperature and consistence. The lower the emulsion temperature, the less is the stuffed caliber and the molding rate.

In case of maximal overstuffing of the **iPeel** casing (for storage of the products in the casing) note, that emulsions with more meat substitutes will swell more in the course of thermal processing, which leads to the pressure build-up inside the product. In this case, bursting of the casing during the thermal processing is avoided by using the minimal recommended stuffed caliber (e.g. for the 20mm nominal caliber, the recommended stuffed caliber is 22mm).

Recommended stuffed caliber

Table 3

Casing caliber, mm	Stick type	Recommended stuffed caliber for removal of casing by peelers	Recommended stuffed caliber for storage of product in casing	Recommended		Recommended chuck
				Horn number	Horn diameter, mm	
16	A/R	16.5 – 17.0	17.0 - 17.5	10-11	7,9-8,7	17/18/19
17	A/R	17.5 -18.0	18.0 - 18.5	10-11	7,9-8,7	17/18/19
18	A/R	19.0 - 19.5	19.5 - 20.5	10-11	7,9-8,7	18/19
19	A/R	20.0 - 20.5	21.0 - 21.5	10-11-12	7,9-8,7-9,5	19/20
20	A/R	21.0 - 21.5	22.0 - 22.5	12-13	9,5-10,3	20/21
21	A/R	22.0 - 22.5	23.0 - 23.5	12-13	9,5-10,3	20/21/22
22	A/R	23.0 - 23.5	24.0 - 24.5	13-14	10,3-11,1	21/22/23
22Ko	A/R	-	24.0 - 25.0	13-14	10,3-11,1	21/22/23
23	A/R	24.0 - 24.5	25.0 - 25.5	14-15	11,1-11,9	22/23
24	A/R	25.0 - 25.5	26.0 - 26.5	14-15-16	11,1-11,9-12,7	22/23/24
24Ko	A/R	-	26.0 - 27.0	14-15-16	11,1-11,9-12,7	22/23/24
25	A/R	26.0 - 26.5	27.0 - 27.5	14-15-16	11,1-11,9-12,7	23/24/25
26	A/R	27.0 - 27.5	28.0 - 28.5	14-15-16	11,1-11,9-12, 7	25/26
27	A/R	28.0 - 28.5	28.5 - 29.0	14-15-16	11,1-11,9-12, 7	25/26/27
28	A/R	29.0 -29.5	29.5 - 30.0	14-15-16	11,1-11,9-12, 7	26/27/28
29	A/R	30.0 -30.5	30.5 - 31.0	14-15-16	11,1-11,9-12, 7	29
30	A/R	31.0 -31.5	31.5 -32.0	18-19-20	14,3-15,2-16	29
31	A/R	32.0 - 32.5	32.5 - 33.5	18-19-20	14,3-15,2-16	29
32	A/R	33.0 - 33.5	34.5 - 35.0	18-19-20	14,3-15,2-16	29
32Ko	R	-	35.0 - 36.0	-	14-16-17	29
34	A/R	35.0 - 35.5	37.5 - 38.0	20	16	29
34Ko	R	-	38.0 - 39.0	-	14-16-17	29
36	R	37.0 - 37.5	38.0 - 39.0	-	14-16-17	29
36Ko	R	-	39.0 - 40.0	-	14-16-17	29
38	R	39.0 - 39.5	40.5 - 41.0	-	14-16-17	29
38Ko	R	-	41.0 - 42.0	-	14-16-17	29

The production rate and the percentage of stuffing of the **iPeel** casing on the frankfurter and wiener equipment should be selected with regard to the technical condition of the equipment. The required molding parameters are achieved by adjustment of the molding equipment in accordance with the technical characteristics of the equipment.

Compliance with the recommended stuffed caliber ensures a stable removal by the casing on peelers, reduces the risk of water and fat pockets and rupture of the casing during molding and thermal processing, and preserves a marketable appearance during storage of the finished products in the casing (festoons).

4.5. Thermal processing

The **iPeel** casing is designed for production according to the traditional technologies, including smoking (smoke roasting), to make products with traditional sensory characteristics typical of the products in cellulose, natural, and synthetic collagen casings.

Manufacturers should choose their individual heat treatment conditions, because the capacity of the heat chamber and the type of smoking (steam generator or atomization system) are all-important in this process, while the required result is achievement of a characteristic dense crust resistant to mechanical impacts, which makes the casing suitable for automatic peeling, or reduction of losses during the thermal processing for storage of the products in the casing.

We recommend the classical thermal processing scheme, which includes the stages of drying (color formation), roasting, smoking, and cooking.

The use of peelers requires a minimal adhesion of the casing to the product, and a dense surface crust resistant to mechanical impacts.

To achieve these parameters of the product, thermal processing should be performed with gradual raising of the temperature.

Drying should start at a temperature of 50-55°C, depending on the emulsion temperature. As the drying progresses, the temperature is stepwise raised to 65°C. At this stage coagulation of the emulsion proteins is achieved, and the 'protein crust' proper is formed.

The **iPeel** casing makes it possible to perform the stages of roasting and smoking at higher temperatures, which greatly extends the possibilities of adjustment of the thermal processing conditions, and optimizes the process.

The recommended next stage is smoking at a temperature of 65-75°C and air humidity of 40-60%. At this stage further consolidation of the crust occurs and the crust becomes colored by the smoke components. For additional solidification of the

crust and color formation, smoking can be performed in two stages, with an intermediate stage of drying or roasting. Then cooking is performed at the air humidity of 100% and temperature of 75-80°C until the product is ready for consumption.

The processes of drying and smoking significantly impact the quality of the finished product. By adjusting the temperature, humidity, and duration of these stages, the thermal processing losses, the crust thickness, the color, and the degree of the smoked flavor and taste of the finished product can be varied.

Smoking in the universal heat chambers can be achieved by three principal methods:

- smoking with an air and smoke mixture (chips or sawdust smoldering under the effect of a heating element or friction of a rotating wooden bar);
- smoking with a steam and smoke mixture (steam is heated to the required temperature and passed through sawdust);
- smoking by atomization (spraying of liquid smoke).

See below the examples of thermal processing conditions for frankfurters, with later removal of the casing by peelers.

Example 1 (see Table 4).
Heat chamber: Vemag. Smoldering smoke generator, beech chips. Diameter of stuffed products: 25mm

Table 4

Process stage	Temperature, °C	Time, minutes	Preset humidity, RH, %.	Actual humidity, RH, %.
Heating	55	15	50	50
Drying	60	10	20	20
Roasting	65	15	20	20
Smoking	70	15	40	40-45
Roasting	75	10	20	20-25
Smoking	75	15	40	40-45
Cooking	80	15 to 72°C in the core	100	100
Total time	95 minutes			

The desired intensity of the smoked flavor and taste at the stages of smoking is achieved by variation of the time, humidity, and temperature. Smoking at a minimal humidity makes it possible to dispense with the additional stage of drying or roasting after cooking. The crust density will be sufficient for removal of the casing by peelers.

Example 2 (see Table 5). Heat chamber: Autotherm. Steam smoke generator. Diameter of stuffed products: 25mm

Table 5

Process stage	T, °C	Time, minutes	Preset humidity, RH, %.	Actual humidity, RH, %.
Heating	55	10	50	50
Drying	60	5	20	20
Smoking	65	15	-	80-85
Roasting	70	15	20	20-25
Smoking	75	15	-	80-85
Cooking	80	8 to 72°C in the core	100	100
Drying	65	15	20	30
Total time	-	83 minutes	-	-

Example 3 (see Table 6). Heat chamber: Atmos. Automization system. Cycle: 2 minutes of liquid smoke supply, 3 minutes of convection. Diameter of stuffed products: 25mm.

Table 6

Process stage	T, °C	Time, minutes	Preset humidity, RH, %.	Actual humidity, RH, %.
Heating	55	15	50	50
Drying	60	5	30	30
Smoking	65	15	-	70-75
Roasting	70	10	20	20-25
Smoking	75	15	-	70-75
Cooking	80	10 to 72°C in the core	100	100
Drying	65	10	20	30
Total time	-	80 minutes	-	-

In the course of smoking at an elevated humidity (70-80%) the coagulated protein casing is not sufficiently dense and resistant to mechanical impacts to be processed by means of peelers. In this case it is recommended to supplement the thermal processing, after the cooking stage, with a stage of drying for 10-15 minutes at the temperature of 65 ºC. If the atomization process runs parallel to the cooking process (spraying of liquid smoke during the cooking), it is also recommended to include a stage of drying for 10-15 minutes at the temperature of 65 ºC.

When it becomes necessary to change the intensity of smoking in the course of thermal processing, the temperature, duration, and humidity of the smoking stages can be adjusted.

The above thermal processing conditions have been tested at many meat processing facilities. Under such thermal processing conditions, frankfurters form a characteristic glossy crust with a smoked flavor and taste. The crust is resistant to mechanical impacts, which provides for excellent automatic peeling of the casing without damaging the product. Such processing conditions are just as well suited for products intended for storage in casing (festoon),

4.6. Cooling for storage of products in casing (festoon)

Upon completion of the thermal processing, the products must be immediately cooled. Cold air cooling is not recommended, because it may lead to appearance of wrinkles on the surface of the product.

Cooling must be performed under running water, preferably under a shower with a sprayer, to increase the cooling area, until the product core temperature is down to 25-35 ºC. After that the products must be moved into a cold store.

Exclude any exposure of the finished products to air drafts (fast-moving air flows) during the storage, because this leads to accelerated evaporation of moisture from the product surface and may cause wrinkles on the surface.

4.7. Cooling and removal of the casing

Removal of the casing is done by the producers, as a rule, on the next day after manufacture of the frankfurters. In that case cooling of the products is made under the standard conditions for products intended for storage in casing (see 4.6 above).

Casing can be removed on the day of manufacture. In such a case, after water cooling (showering) the products must be cooled in a cold store during 3-6 hours,

depending on the diameter of the products. The recommended product core temperature is 10-12 ºC. Exclude any exposure of the finished products to air drafts (fast-moving air flows) during the storage, because this leads to accelerated evaporation of moisture from the product surface and may cause wrinkles on the surface.

Immediately before removal of the casing, shower the products with cold water again during 10-15 minutes.

Peelers are provided with replacement sets for different product diameters; install the required set according to the recommendations of the equipment manufacturer. It is recommended to use a smooth vacuum roller (without knurling).

In the process of removal of the casing, supply steam to the steam pipe of the peeler.

Immediately before putting of a festoon of products into the steam pipe of the peeler, remove the knots from the ends of the festoon to exclude the knots getting into the vacuum roller holes, which may result in winding of the casing on the vacuum roller.

The pressure rollers of the peeler must be adjusted depending on the diameter of the product. The roller pressure must maintain the required engagement of the product for a free and stable (without slipping) transport of the festoon to the casing incision area, without damaging the product.

Provide for a free passage of the festoon of products through the steam pipe, without the festoon looping or knotting.

The peeler speed must be adjusted on a case-by-case basis, depending on the length, diameter, and shape of the products. The greater the diameter and length of the product, the less should be the peeler speed.

The blade should be adjusted for a stable cut of the casing, with a minimal depth of incision.

Adjust the supply of compressed air to open the casing after incision. The compressed air flow should consistently open the cut casing, without damaging the protein crust on the product.

4.8. Transportation and storage of the products

Transportation and storage of the products made with the use of the **iPeel** casing must be in accordance with the relevant regulatory documents.

5. MANUFACTURER'S GUARANTEES

5.1. The Manufacturer guarantees conformity of the **iPeel** casing with the requirements of the Specifications subject to compliance with the required conditions of transportation and storage at the user's warehouse.

5.2. The shelf life of the casing is 2 years from manufacture, subject to integrity of the manufacturer's packing.

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