



iPeel

Process Operating Manual



1. INTENDED PURPOSE

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, produced using traditional technologies, including smoking and (roasting with smoke), it allows to acquire products with traditional sensory characteristics typical of products in cellulose, protein and natural casings.

iPeel (type A, type R) is intended for finished products with subsequent removal of the casing by means of automatic peeler. **iPeel** casing is used for the production and subsequent storage of the finished products in casing (festoons). To increase the shelf life of the organoleptic characteristics of products, it is recommended to use secondary packaging.

iPeel casing is the first plastic casing designed for removal with a peeler, manufactured using our own original technology in accordance with TU 22.21.29-047-27147091-2011 from mixtures of high-quality materials developed by leading polymer manufacturers. The quality of the raw materials used to make the casing is confirmed by Russian and international quality certificates.

iPeel casing has been successfully tested by Rospotrebnadzor, which is confirmed by a state registration certificate, a test report and a certificate of conformity.

2. PROPERTIES AND ADVANTAGES OF THE CASING iPeel

2.1. Technical characteristics of the casing

- 2.1.1. **iPeel** casing is produced on modern equipment that provides:
- constant monitoring of all parameters,
- maximum automation of the production process.
- 2.1.2. The main characteristics of the quality indicators and testing conditions of the **iPeel** casing are given in the technical specifications.





2.2. Advantages of the casing

- 2.2.1. Possibility to remove the casing using a peeler. **iPeel** casing is manufactured using original technology and has properties that allow the casing to be removed from the finished product using an automatic peeler **(type S-A, type S-R).**
- 2.2.2. Optimal adhesion of the **iPeel** casing to various types of minced meat ensures ease of removing the casing from the finished product using an automatic peeler **(type A, type R)**; at the same time, the casing allows storing the finished product in a casing (festoons).
- 2.2.3. The high permeability of the casing to smoking fume and water vapor makes it possible to roast and smoke the product, which gives the product a traditional taste and aroma of smoking. This makes it possible to obtain products with traditional organoleptic characteristics characteristic of products in cellulose, protein and natural casings. Promotes the formation of a dense coagulated protein crust with a glossy surface of the product under the casing. This helps to increase the stability of the process of removing the casing from the finished product without damaging the surface layer of the coagulated protein (crust).
- 2.2.4. Expanded product range. The **iPeel** casing is supplied straight and 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 protein casings.
- 2.2.5. Greatly widen temperature range of **iPeel** casing use versus protein analogues, which is achieved by high temperature sustainability of polymers used in production of casing.
- 2.2.6. High mechanical strength of **iPeel** casing allows to stuff the product on different types of fillers while keeping production speed high and overfilling possibility compared to the nominal caliber. Caliber uniformity provides stable stuffing on modern high-speed automated filling lines and stuffers with twisting device.
- 2.2.7. Microbiological resistance. Polymers used in manufacturing of **iPeel** casing are inert to bacteria and fungi growth. This greatly improves hygienic characteristics of both the casing and finished products.
- 2.2.8. Optimal water vapor and oxygen transmission rates compared with collagen and cellulose casings at the storage temperatures (+2...+6 °C) for the finished products, providing for the following advantages:



- reduction of the oxidation processes in the finished product;
- better preservation of the smoked flavor in the finished product until removal of the casing by means of a peeler, as well as throughout the shelf life of the product stored in the casing (festoons);
- reduced weight losses ($\approx 2-5\%$) in the process of storage (it is recommended to store the products in a gas environment, inside the vacuum packaging);
- retardation of the process of syneresis (liquid separation) in the finished product inside the vacuum packaging. (\approx 1.5–2 time).

3. PRODUCT RANGE

iPeel A type – a closed end in the shirred stick, this casing is designed for processing on automatic equipment.

iPeel S-A type – a closed end in the shirred stick, this casing is designed for the production of all types of emulsified sausages, frankfurters, mini-sausages, with subsequent removal of the casing on a peeler.

iPeel U-A type – a closed end in the shirred stick, this casing is designed for processing on automatic equipment, sale of packaged products.

iPeel FE A type – intended for the Far East and South Asia markets, it has a closed end in the shirred stick, this casing is designed for processing on automatic equipment.

iPeel PRO A type – a closed end in the shirred stick, high-permeable casing is designed for processing on automatic equipment, sale of packaged products.

iPeel PRO S-A type – a casing with superior peelability and closed end of the shirred stick, designed for the production with subsequent removal of the casing with peeler, of all types of frankfurters, wieners, small semi-smoked sausages stuffed with emulsions containing elevated quantities of starch, for thermal processing, both in universal heat chambers, and in liquid smoke atomization units.

iPeel R type – an opened end in the shirred stick, this casing is designed for processing on stuffer linkers.

iPeel S-R type – an opened end in the shirred stick, this casing is designed for the production of all types of emulsified sausages,



frankfurters, mini-sausages, with subsequent removal of the casing on a peeler.

iPeel U-R type – an opened end in the shirred stick, this casing is designed for processing on stuffer linkers, and sale of packaged products.

iPeel FE R type – intended for the Far East and South Asia markets, it has an opened end in the shirred stick, this casing is designed for processing on stuffer linkers.

iPeel PRO R type – an opened end in the shirred stick, high-permeable casing is designed for processing on stuffer linkers, and sale of packaged products.

iPeel Ako type – a ring casing, closed end in the shirred stick, this casing is designed for processing on automatic equipment.

iPeel Rko type – a ring casing, an opened end in the shirred stick, this casing is designed for processing on stuffer linkers.

iPeel-Gut-PRO – a matte plastic casing designed for the production, transportation, storage and sale of traditional sausage products, wieners, mini-sausages.

iPeel PRO S-R type – a casing with superior peelability and opened end of the shirred stick, designed for the production with subsequent removal of the casing with peeler, of all types of frankfurters, wieners, small semi-smoked sausages stuffed with emulsions containing elevated quantities of starch, for thermal processing, both in universal heat chambers, and in liquid smoke atomization units.

iPeel casing is supplied in a shirred form. The casing parameters are presented in Tables 1 and 2 of this document.

Table 1 – iPeel product range

| Casing caliber, | Stick type | Shirring type | Casing footage in one |
|-----------------|------------|---------------|-----------------------|
| mm | | | stick, m |
| | | | (±2%) |
| 15* | A/R | hard | 25.0 |
| 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 |

^{*} caliber 15 only for iPeel type A casing (type R);

Table 2 – iPeel-Gut-PRO product range

| Casing | Stick | Color range | Printing | Footage of | Length of | Shirring type |
|----------|-------|-------------------|--------------|----------------|----------------|---------------|
| caliber, | type | | | shirred stick, | shirred stick, | soft |
| mm | | | | m | mm | |
| 30 | R | Colorless | from | 38 | 360 | + |
| 32 | R | Light smoking | 1+0to 6+6 | 38 | 470 | + |
| 30 | Rko | Smoking Orange | 0.0 | 25 | 470 | + |
| 32 | Rko | | | 31 | 470 | + |
| 34 | R/Rko | Dark orange | | 38/31 | 470 | + |
| 36 | R/Rko | | | 38/31 | 470 | + |
| 38 | R/Rko | | | 38/31 | 470 | + |
| 40 | R/Rko | | | 38/31 | 470 | + |

iPeel casing colors – according to the color catalog.

Changes may be made to the color scheme of the casing.

The casing can be single-side or double-side printed.

Number of print colors from 1 + 0 to 6 + 6.

The only possible printing on ring casings:

- single-sided printing with positioning "on the front side";
- double-sided printing without positioning, provided that a "background coverage" is applied.



^{**} for iPeel PRO casing (type A, R) calibers 19-38

The **iPeel** casing is supplied shirred and packaged under vacuum in accordance with the requirements of international standards. This provides for:

- optimal preservation of the casing characteristics;
- integrity during transportation;
- flawless sanitary/hygienic condition of the product during the transportation to the production area (without the carton) and storage of the casing:
 - reduction of waste disposal costs (no cartons to dispose of).

4. TECHNOLOGY OF USING THE CASING

4.1. Storage and transportation of the casing

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

4.2. Preparation of the casing for processing

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) does not require soaking before use, because the high elasticity of the casing easily provides for the recommended stuffing caliber. This not only improves the production rate, but also ensures a high hygienic level of production;



- the **iPeel** casing (soft shirring) shall be wetted before processing by soaking in potable water (SanPiN 2.1.4.559-96) with the temperature of 25–30 °C during 2–3 minutes;
- it is necessary to remove the shirred casing sticks from the packaging in such a way as not to damage the integrity of the sticks.

If moisture enters the surface of the casing during the production process, a pearlescent effect is possible.

In order to ensure integrity of the shirred sticks after opening of the manufacturer's packing, avoid exposure of the casing to moisture before use.

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

4.3. Forcemeat composition

For production of frankfurters and wieners in the **iPeel** casing according to GOST R 23670-2019 and other regulatory documentation (TU), the quantity of moisture added to the emulsion shall be the same as for protein or cellulose casings.

When new recipes are developed according to the regulatory specifications (TU), the amount of the added water shall 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 shall be followed to avoid formation of water and fat pockets.

4.4. Forming of products

Forming 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 prick the products (puncture the casing). The casing will burst, if punctured.



When using stuffer linkers, observe the direction of stuffing – the shirred sticks shall be put onto the horn with the "herring-bone" inward, i.e. with the "herring-bone" apex towards the stuffer.

When forming products, bear in mind that the packing indicates the minimum stuffing caliber. The nominal caliber is not specified.

To avoid the "zebra" effect on the product after smoking, strictly observe the following rules:

- never touch the shirred stick (hard shirring) with wet hands (the hands shall be dry!) when putting it into the storage hopper;
 - always keep the storage hopper dry.

Failure to observe these rules may cause dark spiral stripes on the products after the thermal processing.

The stuffed caliber for the **iPeel** casing depends on the end use of the finished product.

When the finished products are intended for automatic peeling, it is recommended to use the minimum stuffed caliber, e.g. for the 20 mm nominal caliber, the recommended stuffed caliber shall be 21 to 21.5 mm.

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

Tables 3 and 4 of this document provide recommended filling calibers for removing the casing on the peeler and storing products in the casing (festoons).

It shall be borne in mind that the ultimate stuffed gauge and the stuffing rate for both stuffing options may vary not only with the technical condition of the forming equipment, but also depending on the emulsion temperature and consistency. The lower the emulsion temperature, the less shall be the stuffed caliber and the forming rate.

In the case of maximum overfilling of the **iPeel** casing (for storage of products in the casing) bear in mind 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 minimum recommended stuffed caliber (e.g. for the 20 mm nominal caliber, the recommended stuffed caliber shall be 22 mm).





Table 3 – Recommended filling calibers

| | | | | | Lleve die ee et | | |
|--------|---|--------------|------------|--------------------|-------------------|-------------|----------|
| | | Recommende | Recommende | ende Horn diameter | | | |
| | asing Stick calibers for caliber for type casing product disturbing caliber for product | | d stuffing | | | Handtman | D |
| | | | Tov | vnsend | n AL / | Recommended | |
| mm | | | | Vemag/ | number of head | | |
| 111111 | | removal with | storage in | Llawa | | Hitec | Orriead |
| | | a peeler | casing | Horn number | mm | mm | |
| 15* | A/R | _ | 15.5–16.0 | 10 | 7.9–8.7 | 8–9 | 15/16 |
| 16 | A/R | 16.5–17.0 | 17.0–17.5 | 10–11 | 7.9–8.7 | 8–9 | 15/16 |
| 17 | A/R | 17.5–18.0 | 18.0–18.5 | 10–11 | 7.9–8.7 | 8–9 | 15/16/17 |
| 18 | A/R | 19.0–19.5 | 19.5–20.0 | 10–11 | 7.9–8.7 | 8–9 | 16/1718 |
| 19** | A/R | 20.0–20.5 | 21.0–21.5 | 11–12 | 8.7–9.5 | 9–10 | 17/18/19 |
| 20** | A/R | 21.0–21.5 | 22.0–22.5 | 12–13 | 9.5–10.3 | 10–11 | 18/19/20 |
| 21 | A/R | 22.0–22.5 | 23.0–23.5 | 12–13 | 9.5–10.3 | 10–11 | 19/20/21 |
| 22** | A/R | 23.0–23.5 | 24.0–24.5 | 13–14 | 10.3–11.1 | 11–12 | 20/21/22 |
| 22ko | A/R | _ | 24.0–25.0 | 13–14 | 10.3–11.1 | 11–12 | 20/21/22 |
| 23 | A/R | 24.0–24.5 | 25.0–25.5 | 14–15 | 11.1–11.9 | 11–12 | 21/22/23 |
| 24** | A/R | 25.0–25.5 | 26.0–26.5 | 14–15–16 | 11.1–11.9–12.7 | 12–13 | 22/23/24 |
| 24ko | A/R | _ | 26.0–27.0 | 14–15–16 | 11.1–11.9–12.7 | 12–13 | 22/23/24 |
| 25 | A/R | 26.0–26.5 | 27.0–27.5 | 14–15–16 | 11.1–11.9–12.7 | 12–13 | 23/24/25 |
| 26** | A/R | 27.0–27.5 | 28.0–28.5 | 14–15–16 | 11.9–12.7–13.5 | 12–13 | 24/25/26 |
| 27 | A/R | 28.0–28.5 | 28.5–29.0 | 14–15–16 | 12.7–13.5–14.3 | 13–14 | 25/26/27 |
| 28** | A/R | 29.0–29.5 | 29.5–30.0 | 14–15–16 | 12.7–13.5–14.3 | 13–14 | 26/27/28 |
| 29 | A/R | 30.0–30.5 | 30.5–31.0 | 14–15–16 | 12.7–13.5–14.3 | 13–14 | 29 |
| 30 | A/R | 31.0–31.5 | 31.5–32.0 | 18–19–20 | 14.3–15.8 | 14–17 | 29 |
| 31 | A/R | 32.0–32.5 | 32.5–33.5 | 18–19–20 | 14.3–15.8 | 14–17 | 29 |
| 32** | A/R | 33.0–33.5 | 34.5–35.0 | 18–19–20 | 14.3–15.8 | 14–17 | 29 |
| 32ko | R | _ | 35.0–36.0 | _ | 14.3–15.8 | 14–17 | 29 |
| 34** | A/R | 35.0–35.5 | 37.5–38.0 | 20 | 14.3–15.8 | 14–17 | 29 |
| 34ko | R | _ | 38.0–39.0 | _ | 14.3–15.8 | 14–17 | 29 |
| 36** | R | 37.0–37.5 | 38.0–39.0 | _ | 14.3–15.8 | 14–17 | 29 |
| 36ko | R | _ | 39.0–40.0 | _ | 14.3–15.8 | 14–17 | 29 |
| 38** | R | 39.0–39.5 | 40.5–41.0 | _ | 14.3–15.8 | 14–17 | 29 |
| 38ko | R | _ | 41.0-42.0 | _ | 14.3–15.8 | 14–17 | 29 |

^{*} caliber 15 only for iPeel type A casing (type R);





^{**} for iPeel PRO casing (type A, R) calibers 19–38.

Table 4 - Recommended filling calibers for iPeel-Gut-PRO casing

| | | Recommend | Recommended | | | | |
|--------------------------|---------------|---|--|--------------------------------------|----------------------------|-------------------------------------|---------------------------------------|
| Casing caliber, mm | Stick type | ed stuffing caliber for product storage in casing | Horn diameter, mm Handtmann / Vemag / Hitec | Horn diamete r COMPO, mm | Townsend horn number | Townsend horn diameter, mm | Recom- mended number of head |
| 30 | R | 32.0–32.5 | 14–17 | 12.5 | 18–20 | 14.3–15.8 | 29 |
| 30ko | R | 33.0–33.5 | 14–17 | 12.5 | 18–20 | 14.3–15.8 | 29 |
| 32 | R | 34.0–34.5 | 14–17 | 16.9 | 18–20 | 14.3–15.8 | 29 |
| 32ko | R | 35.0–35.5 | 14–17 | 16.9 | 18–20 | 14.3–15.8 | 29 |
| 34 | R | 36.0–36.5 | 14–17 | 16.9–20 | 18–20 | 14.3–15.8 | 29 |
| 34ko | R | 37.0–37.5 | 14–17 | 16.9–20 | 18–20 | 14.3–15.8 | 29 |
| 36 | R | 38.0–38.5 | 14–17 | 16.9–20 | 18–20 | 14.3–15.8 | 29 |
| 36ko | R | 39.0–40.0 | 14–17 | 16.9–20 | 18–20 | 14.3–15.8 | 29 |
| 38 | R | 40.5–41.0 | 14–17 | 16.9–20 | 18–20 | 14.3–15.8 | 29 |
| 38ko | R | 42.0–42.5 | 14–17 | 16.9–20 | 18–20 | 14.3–15.8 | 29 |
| 40 | R | 42.5–43.0 | 14–17 | 16.9–20 | 18–20 | 14.3–15.8 | 29 |
| 40ko | R | 44.0–44.5 | 14–17 | 16.9–20 | _ | _ | 29 |

The production rate and the overfilling ratio for the iPeel casings shall be determined with regard to the technical condition of the equipment used for making of frankfurters and wieners. The required forming parameters are achieved by adjustment of the forming equipment within the range of its specifications.

Compliance with the recommended stuffed caliber ensures consistently easy removal of the casing by peelers, reduces the risk of water/fat pockets and ruptures of the casing in the process of forming and thermal processing, and preserves the good look of the finished products during their storage in the casing (festoons).

4.5. Thermal processing

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



Manufacturers shall choose their individual thermal processing 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 the thermal processing losses for the products stored with the casing on.

We recommend the classical thermal processing mode, which includes the stages: color formation, drying, roasting, smoking, and cooking.

Automatic peeling 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 shall be performed by raising the temperature gradually.

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

The **iPeel** casing makes it possible to perform the stages of roasting and smoking at higher temperatures, which greatly extends the adjustment range 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 improvement, smoking can be performed in two stages, with an intermediate stage of drying or roasting. Then cooking is performed at the air humidity of 99% and a temperature of 75–80 °C until the product is ready for consumption.

The processes of drying and smoking significantly influence 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 intensity of the smoke flavor and taste of the finished product can be varied.

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



- smoking with an air and smoke mixture (chips or sawdust smoldering by means of a heating element or a rotating wooden friction 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).

Below are examples of thermal processing conditions for frankfurters intended for automatic peeling.

Example 1 (see Table 5 of this document).

Cooking chamber: Vemag. Smoldering smoke generator, beech chips. The diameter of the products when filled is 25 mm.

| Process stage | Temperature, | Time, | Target | Actual humidity, |
|-----------------|--------------|--------------------|-----------|------------------|
| | °C | min | humidity, | RF% |
| | | | RF% | |
| Heating-up | 55 | 15 | 50 | 50 |
| Drying | 60 | 10 | 20 | 20 |
| Hot air cooking | 65 | 15 | 20 | 20 |
| Smoking | 70 | 15 | 40 | 40–45 |
| Hot air cooking | 75 | 10 | 20 | 20–25 |
| Smoking | 75 | 15 | 40 | 40–45 |
| Boiling | 80 | 15 | 99 | 99 |
| | | up to 72 °C in the | | |
| | | center | | |
| Total time | | 95 minutes | | |

Table 5 – Example 1

By varying time, humidity and temperature during the smoking stages, the required intensity of the smell and taste of smoking is achieved. Carrying out smoking with minimal humidity does not require the introduction of an additional drying or frying stage after the cooking process. A crust density sufficient for removing the casing on a peeler is achieved.

Example 2 (see Table 6 of this document).

Cooking chamber: Autothehrm. Steam smoke generator. The diameter of the products when filled is 25 mm.





| Process stage | Temperature, | Time, | Target | Actual humidity, |
|-----------------|--------------|------------------------------|-----------|------------------|
| | °C | min | humidity, | RF% |
| | | | RF% | |
| Heating-up | 55 | 10 | 50 | 50 |
| Drying | 60 | 5 | 20 | 20 |
| Smoking | 65 | 15 | _ | 80–85 |
| Hot air cooking | 70 | 15 | 20 | 20–25 |
| Smoking | 75 | 15 | _ | 80–85 |
| Boiling | 80 | 8 | 100 | 100 |
| | | up to 72 $^{\circ}$ C in the | | |
| | | center | | |
| Drying | 65 | 15 | 20 | 30 |
| Total time | _ | 83 min | _ | _ |

Example 3 (see Table 7 of this document).

Cooking chamber: Atmos. Atomization system. Cycle, 2 minutes supply of liquid smoke, 3 minutes convection. The diameter of the products when filled is 25 mm.

Table 7 – Example 3

| Process stage | Temperature, | Time, | Target | Actual humidity, |
|-----------------|--------------|--------------------|-----------|------------------|
| | °C | min | humidity, | RF% |
| | | | RF% | |
| Heating-up | 55 | 15 | 50 | 50 |
| Drying | 60 | 5 | 30 | 30 |
| Smoking | 65 | 15 | _ | 70–75 |
| Hot air cooking | 70 | 10 | 20 | 20–25 |
| Smoking | 75 | 15 | _ | 70–75 |
| Boiling | 80 | 10 | 100 | 100 |
| | | up to 72 °C in the | | |
| | | center | | |
| Drying | 65 | 10 | 20 | 30 |
| Total time | - | 80 min | _ | - |

When smoking is performed at elevated humidity (70–80%), the resulting coagulated protein crust is not sufficiently dense or resistant to mechanical impacts to be processed by means of peelers. In this case it is recommended to supplement the thermal processing with a stage of drying during 10–15 minutes at the temperature of 65 °C. If the atomization process runs parallel to the cooking process (spraying of liquid smoke during the cooking), it is also recommended to add a 10–15 min stage of drying at the temperature of 65 °C. 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 peeling of the casing without damaging the product. Such processing conditions are just as well suited for products intended for storage in casing (festoons).

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

After the heat treatment process is complete, the product shall be cooled immediately. Cold air cooling is not recommended, because it may lead to appearance of wrinkles on the surface of the product. Cooling shall be performed under running water, preferably under a spraying shower to increase the cooling area, until the product core temperature is down to 25–35 °C. After that the products shall be moved into a cold store.

Exclude any exposure of the finished products to air draughts (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

As a rule, the processors remove the casing on the next day after manufacture of the frankfurters. In this case cooling of the products is done under the standard conditions for products intended for storage in casing (see 4.6 above).

Casing can be removed on the day of manufacture. The recommended product core temperature is 10–12 °C. Exclude any exposure of the finished products to air draughts (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.

Just before removal of the casing, spray the products with cold water again.



Peelers are provided with replacement sets for different product diameters; install the required set according to the recommendations of the equipment manufacturer.

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

Immediately before putting of the festoons of products into the steam pipe of the peeler, remove the knots from the ends of the festoons to prevent 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 shall be adjusted depending on the diameter of the product. The roller pressure shall be sufficient to maintain the required contact with the product for a free and steady (without slipping) transport of the festoons to the casing incision area, without damaging the product.

Provide for free passing of the festoons of products through the steam pipe, without the festoons looping or knotting.

The peeler speed shall be adjusted on a case-by-case basis, depending on the length, diameter, and shape of the products.

The blade shall be adjusted for effective cutting 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 shall reliably open the cut casing, without damaging the protein crust on the product.

4.8. Transportation and storage of products

Transportation and storage of products manufactured using the **iPeel** casing are carried out in accordance with the regulatory documentation for these products (GOST, TU).

5. MANUFACTURER WARRANTY

- 5.1. The manufacturer guarantees that the **iPeel** casing complies with the requirements of the specifications, subject to the conditions of transportation and storage in consumer warehouses.
- 5.2. The shelf life of the casing is 2 years from the date of manufacture, provided that the integrity of the original packaging is maintained.



6. APPENDICES

There are no appendices in this document.

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