

Process Operating Manual



ATLANTIS-PAK
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Packaging Solutions



AMICEL CASING



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1. APPLICATION

The **AMICEL** casing is a monolayer plastic casing permeable to process smoke, and is designed for production of all types of frankfurters, wieners, hot dogs, and mini-sausages made by technological processes 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 and synthetic collagen casings.

The **AMICEL** casing is made of high-quality synthetic and natural materials.

The **AMICEL** casing is supplied straight or ring-shaped, thus providing for a wider assortment of products differing in their appearance.

The recommended shelf life:

- for frankfurters packaged in the **AMICEL** casing - 5 days at a storage temperature from +2 to +6°C;
- for wieners packaged in the **AMICEL** casing - 7 days at a storage temperature from +2 to +6° C.

2. PROPERTIES AND ADVANTAGES

2.1. Technical characteristics of the casing

2.1.1. The **AMICEL** casing is made on advanced equipment, which ensures:

- continuous control of all parameters;
- maximum automation of the production process

2.1.2. See Table 1 for the basic quality characteristics and test conditions for the **AMICEL** casing.

Table 1

Parameter	Values	Unit measure	Test conditions
Thickness, mean value	17.0	μm	Schroeder thickness gauge with a ball measuring pad, T=23°C, humidity = 65% RH
Utilization temperature range	from -40 to +100	°C	
Water vapor transmission rate	350-620	g/m ² * 24 hrs	At T=30°C, humidity=90% RH

Tensile strength, MD TD	from 15.0 to 25.0 from 15.0 to 27.0	kgf/mm ²	Shimadzu AGS H test machine, V=100mm/min, T=23°C, humidity=65% RH
Elongation at break, MD TD	from 60 to 150 from 70 to 210	%	Shimadzu AGS H test machine, V=100mm/min, T=23°C, humidity=65% RH
Tube width tolerance, not more	2	%	Electronic control system

2.2. Advantages of the casing

2.2.1. The **AMICEL smoke-permeable** casing makes it possible to roast and smoke the products to impart to them the characteristic pleasant taste and flavor of smoke, and to form the coagulated protein crust and glossy surface of the product under the casing.

2.2.2. The **high mechanical strength** of the **AMICEL** casing makes it possible to mold chubs not only by manual tying, but also 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 **AMICEL** casings provides for stable filling on frankfurter lines and stuffers with twisting devices.

2.2.3. The **high oxygen barrier properties** compared with protein and cellulose casings provide for the following advantages:

- reduction of oxidation processes;
- preservation of the individual flavor of spices in the finished products throughout the shelf life.

2.2.4 Low permeability to water vapor.

The **AMICEL** casing is an economical alternative to cellulose casings, because of lower moisture losses during the thermal processing and storage (it has been found in practice, that the heat losses of the products in the **AMICEL** casing are 1.5-2.0 times less in comparison with cellulose casings). The water vapor transmission rate of the **AMICEL** casings is 1.2 to 1.5 times lower than that of cellulose casings, and is at a level that makes it possible to:

- achieve the required degree of smoking of sausage products with characteristic taste and flavor, and the coagulated protein crust on the surface;
- reduce moisture losses during the thermal processing and storage of frankfurters and wieners packaged in the **AMICEL** casings.

2.2.5. The **high heat resistance** of the polymers used to make the **AMICEL** casings significantly extends the temperature range of utilization of the casing in comparison with protein and cellulose casings. The casing is stable at high temperatures.

2.2.6. **Microbiological resistance.** The materials used for production of the **AMICEL** 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.

2.2.7. **Reduced adhesion to different emulsions** results in easy peeling of the casing off the finished product without damage to the surface layer of coagulated protein, which is especially important for frankfurters and wieners.

3. ASSORTMENT OF PRODUCTS

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

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


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

AMICEL 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;

The **AMICEL** casings are supplied shirred. Vacuum packaging is recommended for better preservation of the properties of the casing. The parameters of the casing are shown in Table 2.

Table 2

Casing caliber, mm	Stick type	Shirring type	Length of casing in stick, m ($\pm 2\%$)
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
24	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	hard	33.3



34	A	hard	33.3
32	R	soft	30.0
34	R	soft	50.0 (30.0)
38	R	soft	50.0 (30.0)
22	Ako/Rko	hard	25.0
24	Ako/Rko	hard	25.0
32	Rko	soft	30.0
34	Rko	soft	30.0
38	Rko	soft	30.0

Colors of the **AMICEL** casings: clear, light smoke, smoke, orange, red orange, dark orange.

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 to 6. CMYK printing is optional.

Location of the printing on ring-shaped casings is not regulated.

Exclusive services can be ordered.

Shirring options include:

- bespoke length of the stick or of the shirred casing;
- double closure of sticks (for type A sticks).

4. UTILIZATION 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 800mm from heaters, in the absence of strong-smelling or corrosive substances, at a temperature from + 5°C to +35°C and relative humidity of the air not more than 80%.

4.1.2. The **AMICEL** casing must be transported at a temperature not exceeding +40°C, and protected against direct sunlight.


4.1.3. If the casing was stored at a temperature from -5 °C to +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 **AMICEL** casing for stuffing consists in the following:





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

The **AMICEL** casing does not require pre-soaking before use, because the high elasticity of the casing easily provides for the recommended stuffed caliber. This not only improves the production rate, but also ensures a high hygienic level of works;

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 any exposure of the casing to moisture before 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 **AMICEL** casing, the quantity of the moisture added to the emulsion must be the same as for collagen and cellulose casings.

In the development of 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 **AMICEL** 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 frankfurters and wieners (perforate the casing). The casing will burst, if punctured.

Observe the direction of stuffing - the shirred sticks must be put over the horn with the 'herring-bone' inward, i.e. with the 'herring-bone' apex towards the stuffer.

To avoid the 'zebra' effect on the product after smoking, strictly observe the following rules for molding:

- never touch the shirred stick with wet hands (the hands must be dry!) when putting it into the storage hopper;
- always keep the storage hopper dry;
- prevent water drops falling on the shirred sticks when washing the emulsion remnants from the equipment;


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

The rate of stuffing of the **AMICEL** casing on twisting devices must be adjusted with regard to the technical condition and capacity of the equipment.

The actual stuffed caliber depends on many factors, such as temperature, emulsion consistence, and condition of the stuffing equipment. The lower the emulsion temperature, the less is the stuffed caliber. Note also, that all processing measures aimed at greater binding of water (greater yield) lead to greater internal pressure of the emulsion during the thermal processing. Emulsions with more meat substitutes will swell more. To preserve a significant water-binding capacity of the emulsion and avoid ruptures of the casing during the thermal processing, we recommend to use the minimal stuffed caliber (e.g., 24.0mm for 22mm nominal caliber casings), and reduce the stuffing rate by 10-20%. In practice, the stuffed caliber for the **AMICEL** casing is determined on production site, and may change depending on the type of the product and equipment used.

Table 3

Casing caliber, mm	Type of 'stick'	Recommended stuffing caliber, mm	Recommended horn diameter, mm
17	A, R	17.5 -18.0	8
18	A, R	18.5 - 19.0	8
19	A, R	20.0 - 20.5	10
20	A, R	22.0 - 22.5	10
21	A, R	23.0 - 23.5	10
22	A, R	24.0 - 24.5	11-12
24	A, R	26.0 - 26.5	11-12 (13.5)
26	A, R	28.0 - 28.5	11-12 (13.5)
27	A, R	29.0 -29.5	11-12 (13.5)
28	A, R	30.0 -31.0	12 -14
29	A, R	31.5 -32.5	14 -16
30	A, R	32.5 -33.0	14 -16
31	A, R	33.5 -34.0	14 -16
32	A	34.5 - 35.0	17



34	A	36.5 - 37.0	17
32	R	35.0 - 35.5	16 - 18
34	R	37.5 - 38.0	16 - 18
38	R	41.0 - 42.0	16 - 18
22	Ako/Rko	24.0 - 24.5	11 - 12 (13.5)
24	Ako/Rko	26.0 - 26.5	11 - 12 (13.5)
32	Rko	35.0 - 36.0	16 - 18
34	Rko	37.0 - 38.0	16 - 18
38	Rko	41.0 - 42.0	16 - 18

The production rate and the percentage of stuffing of the **AMICEL** 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 good appearance of the finished products, increases the stuffing capacity, and reduces the risk of water and fat pockets and ruptures of the casing.

4.5. Thermal processing

Thermal processing of frankfurters and wieners in the **AMICEL** casing is made in fixed shaft chambers or in universal heat chambers.

Manufacturers should choose their individual heat treatment conditions, because the capabilities of the equipment (a shaft-type fixed chamber or a universal chamber) are all-important in this process, while the desired result is achievement of a better crust or reduction of losses during the thermal processing.

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

Drying should start at a temperature of 50-55°C. At this stage coagulation of the emulsion proteins is achieved, and the 'protein crust' is formed.

Next follows the stage of smoking at a temperature of 65-70°C and air humidity of 40-60%. At this stage the crust becomes colored by the smoke components.

Then cooking is performed at the air humidity of 100% and a temperature of 75-80°C until the product is ready for consumption.

The cooking stage should be followed by an additional stage of drying during 10-15 minutes at the temperature of 65°C to restore the crust damaged at the stage of cooking.

The processes of drying and hot smoking have a significantly impact on the quality of the finished product. By adjusting the temperature, moisture, and duration of these stages, the moisture losses, crust density, color and taste of the product can be varied.

Below are examples of thermal processing conditions for the **AMICEL** casing:

Example 1 (Table 4). Autotherm chamber with a steam smoke generator

Table 4

Process stage	T, °C	RH, %	t, minutes
Heating	55	25	10
Drying	65	25	20
Smoking with wet smoke	68	80	10
Drying (airing)	75	25	10
Smoking with wet smoke	75	80	10
Cooking to consumption readiness	80	100	20
Total time			80

Differentiation of the taste of frankfurters using this method of smoking is achieved by increasing or decreasing the time of smoking and the moisture content.

If a denser crust is desired, reduce the preset moisture in the chamber. Another method is to eliminate the stage of cooking and bring the product to consumption readiness at the stage of smoking, disposing of the final stage of drying.

Excellent results have been obtained by the following thermal processing of frankfurters in the **AMICEL** casing:

Example 2 (Table 5). Vemag heat chamber, a combination of convection and steam smoking. Cooking with smoke supply is the distinctive feature of this process.

Table 5

Process stage	Heat processing conditions	
1	2	3
Drying	60°C, 10-15 minutes	Exhaust damper open, exhaust ventilation on, fan speed high
Roasting	65°C, 15-20 minutes	Fresh air inlet damper and exhaust damper open, exhaust ventilation on, fan speed high
Smoking	70°C, 15-20 minutes	Exhaust damper open, fan off

Cooking	80°C to 72°C in chub core	Smoke supply continues, exhaust damper open, exhaust fan speed high
Drying	60 °C, 5-10 minutes	Fresh air inlet damper and exhaust damper open, exhaust ventilation on, fan speed high
Moisture loss	6-8%	
Total time	55 min. - 1 hr 05 min.	


Example 3 (see Table 6). REX-POL heat chambers

Process stage	Heat processing conditions	
1	2	3
Settling	55°C, RH=50%, 10 minutes	-
Drying	65 °C, 15 minutes	Fan speed 2
Drying	70 °C, 15 minutes	Exhaust damper open, fan speed 2
Smoking 1	70 °C, 10 minutes	Exhaust fan speed 1
Cooking 2	78 °C to 69 °C in the chub core	Fan speed 1, with supply of smoke
Smoking 3	75 °C - 2 minutes	Fan speed 2, exhaust damper 1/3 open
Cooking 1	78 °C to 72 °C in the chub core	-
Drying 2	75 °C, 15 minutes	Fan speed 2, fresh air inlet damper open
Moisture loss	5-7%	
Total time	1 hr 05 min.	

These thermal processing conditions have been tried at several meat processing facilities. Such thermal processing conditions for frankfurters ensures a characteristic crust, and the frankfurters preserve their juice, and peel off easily.

4.6. Cooling

After completion of the thermal processing, the products must be immediately cooled. Cold air cooling is not allowed. Cooling can be carried out under running



water, preferably under a shower by means of spraying devices to increase the cooling area, until the chub core temperature is down to 25 - 35 °C.

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.

5. MANUFACTURER'S GUARANTEES

5.1 The Manufacturer guarantees conformity of the 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 guarantee term of storage of the casing is 2 years from manufacture, subject to integrity of the manufacturer's packing.



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